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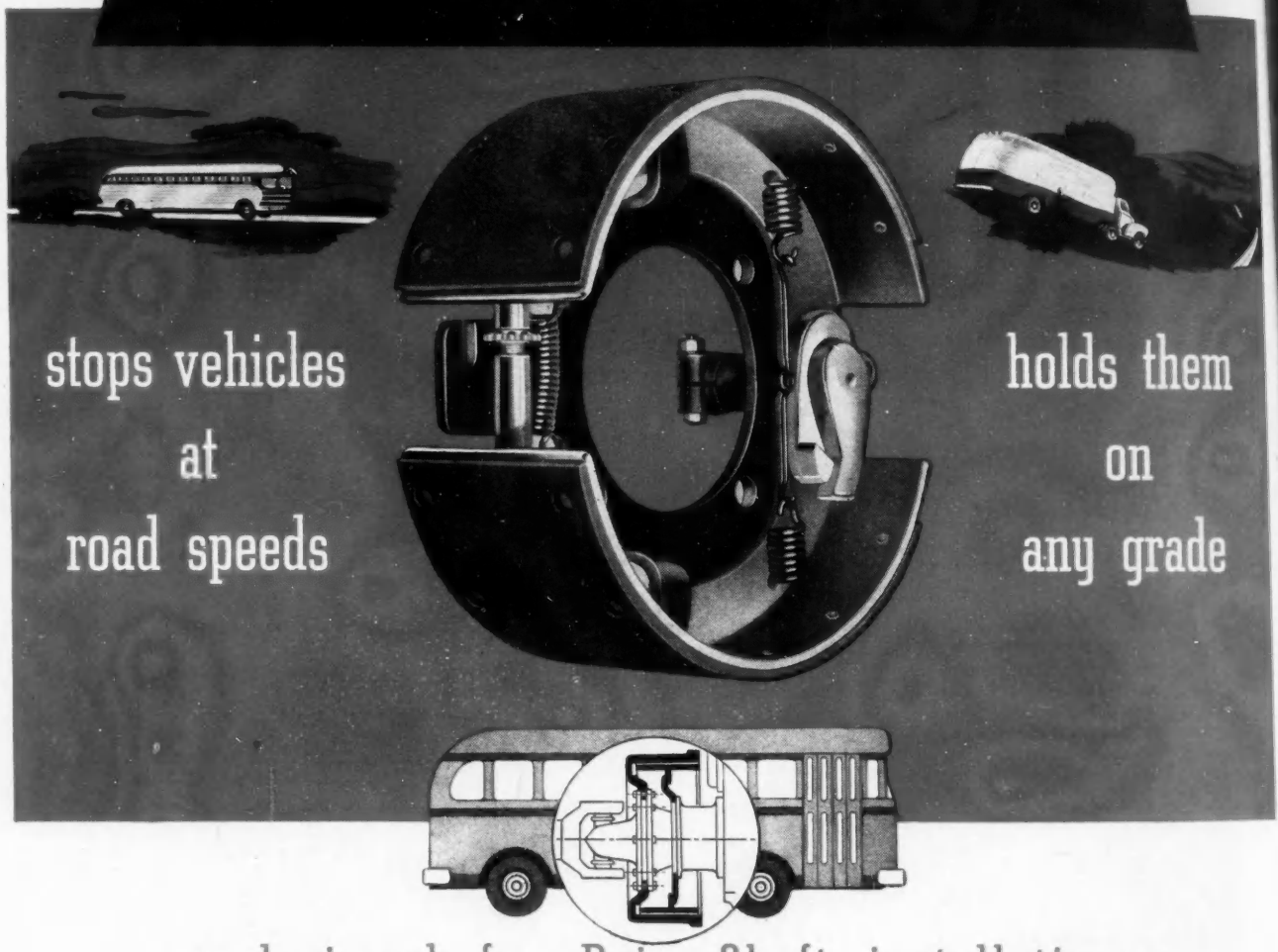
new Bendix

EMERGENCY and PARKING BRAKE for TRUCKS and BUSES



★ designed for Drive-Shaft installations

When it comes to an emergency brake, only a brake that will stop the vehicles at roadspeeds and hold them on any grade is *safe enough* today. To fill this need for a real emergency brake, as well as for a parking brake Bendix*—foremost builder of automotive brakes—has designed a new brake for driveshaft installation.

This rugged, mechanically operated brake is of the time-proved Duo-Servo* type of shoe action. Heavy-duty shoes are supported by a center plate. This center plate is in line with the center of the brake shoes, so that the brake torque forces are center-loaded on the supporting member. This center-loading of stresses on correctly designed parts results in a brake that is smooth and powerful in action, yet light in over-all weight. Simple to maintain—the only adjustment necessary is a simple one for lining wear; the shoes are self-centering within the drum.

Write for the details. Your letter will receive prompt attention.

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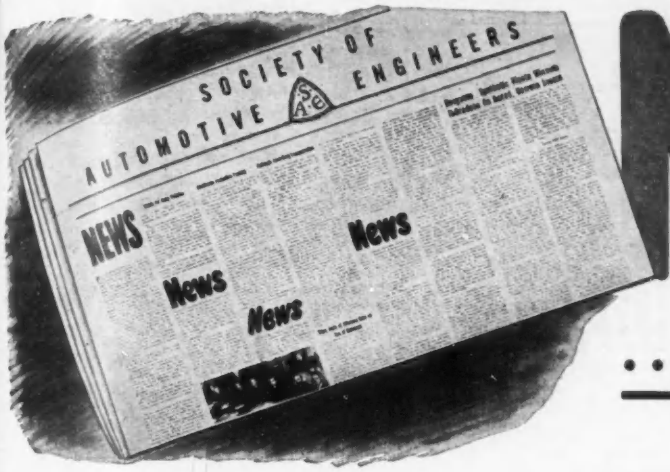

News..

..OF THE SOCIETY

Shot Peening Group Probes Pellet "Breakage Resistance"

ACTION by the SAE Shot Peening Committee is now under way to establish an acceptable means of evaluating that property of shot termed "resistance to breakage." This project is highly important to industry because improvement of shot quality is the most serious problem facing industry in the application of the shot peening process.

To fully appreciate the significance of shot breakage, it is necessary to review the function of shot peening. Properly employed, shot peening is quite an asset to the fabricator of dynamically loaded metal parts. Critical factor of such parts is fatigue durability. Although durability is enhanced as surface finish improves, any surface, no matter how finely finished, is a stress raiser as it is a discontinuity in itself, not being supported by other particles.

If the surface can be pre-stressed in compression, fatigue life of the part will be improved. Practically, this is what was accomplished by the blacksmith who hammered buggy springs to increase their durability, and by the ship builder, who finished propeller shafts by rolling the surface under pressure rolls.

These same useful compressive pre-stresses are imparted to the finished part by throwing iron or steel pellets at it; this is the shot peening process. Beneficial pre-stresses are obtained, increasing fatigue resistance without the distortion possible with the earlier crude methods.

Fig. 1 demonstrates one type of application. It depicts a shot-blasting operation on an airplane propeller blade. The diver's suit protects the operator from the ricocheting of thousands of pellets expelled from the hose in his hand under pressures of up to 85 psi.

But all goes not well for shot peening as the shot available at present breaks too rapidly. Since the shot is recirculated during the process, fractured shot becomes ineffective and might even damage finely finished surfaces.

It is the solution of this problem that confronts the subcommittee on shot testing methods under the chairmanship of N. S. Mosher, Chevrolet Division, General Motors Corp. The subcommittee breaks down its project into two phases, namely:

1. Improvement of shot quality;
2. Establishment of suitable standards for determining quality.

As regards quality, there is general agreement among the subcommittee members that steel shot will perform more satisfactorily than the present iron varieties. Shape is an important feature; round, solid pellets are better than irregular shaped hollow particles. Physically, an ideal shot would be steel ball bearings, as they satisfy these requirements. But their cost is obviously prohibitive.

Preparation of shot quality standards centers about the establishment of a test enabling prediction of the relative performance of two or more samples of shot in a production machine. Considerable work is now being carried on toward the standardization of a test machine and a test method which can be used throughout the industry.

A number of test machines have already been proposed and comparative tests were run on two of these machines at a recent meeting in Pittsburgh.

Origin of Activity

Attention was focused on shot peening applications during the war period. With an eye toward improving the process as an aid to war production, J. O. Almen, General Motors Corp., called a meeting in February, 1943, of shot and shot peening equipment manufacturers and users to discuss the shot peening process, particularly the shot. Shot available at that time was not satisfactory for peening.

Emphasized at that meeting was the need for better quality shot. As a result of this

Fig. 1—This is not a "deep sea diver" at work in the briny deep. Depicted is a "landlubber" performing a shot peening operation on an airplane propeller blade. The diver's suit affords him protection from the ricocheting of thousands of pellets expelled from the hose in his hand under pressures of up to 85 psi

The Mayo Tulsa, Okla.

NOVEMBER 7-8

SAE National

FUELS AND LUBRICANTS

Meeting

Dinner Speakers:

Dr. H. B. Hass, Purdue University
"The Significance of Atomic Energy"

A. W. Herrington, Marmon-Herrington Co.
"Indianapolis Races"

conference, a recommendation was submitted to the SAE that a committee be organized to cope with the problem. The SAE Shot Peening Committee was created under the chairmanship of Mr. Almen with the following as its objectives:

1. To establish standard shot sizes and designations;
2. To establish quality tests for the shot and the work;
3. To make general recommendations pertaining to shot peening operations.

Since that initial meeting, the Committee has realized to a great extent its objectives and has been instrumental in advancing the art. Concrete accomplishments of the Committee which have established shot peening as a standard manufacturing process are:

a. Establishment of standard shot sizes, size tolerances, and size numbers;
b. Establishment of a standard method of testing shot for size;
c. Establishment of similar size standards for blast cleaning and shot grit.

These standards have been adopted by both shot manufacturers and users and are included in the SAE 1946 Handbook.

Just as important an achievement of the Committee as its standards work is that it brought together both manufacturers and users for the first time to work and cooperate on a common program. Pioneering efforts of the automotive industry in this field will pave the way for many new applications in other manufacturing areas.

Activity seen by the Committee as worthy of future study after solution of present shot quality problems are process control standards. Although the shot peening process is quite simple in itself, certain salient variables, aside from shot size, deserve scrutiny. Consideration is being given, for example, to standards for measurement of shot intensity. Along these same lines is a proposed study on the degree of shot effectiveness. Hoped for in this project is discovery of a means to determine the difference between short period exposure to the shot blast and long duration exposure. Still another potential project reserved for the future is the preparation of a shot peening manual.

CRC Aid to War Effort Cited by Army & Navy

AWARDS have been made to the Coordinating Research Council for contributions to the solution of war emergency problems by the U. S. War Department, U. S. Army Ordnance, U. S. Navy, and U. S. Navy Bureau of Ordnance.

The Council received the U. S. Army Ordnance Department's Distinguished Service Award on July 20, 1944, and the Navy's Certificate of Achievement on Dec. 3, 1945.

Walter G. Ainsley, then project director, and the members of the CRC-CLR Grease Advisory Group received the Naval Ordnance Development Award on Nov. 28, 1945. Rear-Adm. G. F. Hussey, Jr., Chief of the Bureau of Ordnance, U. S. Navy, cited as grounds for the award "distinguished service to the research and development of naval ordnance, and in particular for outstanding contribution to the development of Torpedo Lubricants, Extreme Pressure Grease for Naval Ordnance, and several new grease-testing methods."

The third award for Council war activity was the War Department Certificate of Appreciation presented to C. B. Veal, Manager of the CRC, for "cooperation and assistance in the Ordnance Munitions Program during the Emergency."

The Navy Certificate of Achievement, awarded to the Council on Dec. 3, 1945, signalized "the Navy's recognition of the splendid efforts put forth by the men and women of your organization in support of the war production program."

The Council received requests for research assistance or has cooperated in research with 14 divisions or branches of the Army, with 6 Navy organizations, and with 12 Government agencies other than the armed services.

Approximately 300 separate projects, engaging the participation of about 2000 technicians, chemists, physicists, and engineers were carried out. These 300 projects ranged in nature from the practical business of teaching war-recruited, inexperienced personnel the details of test engine installation and operation, to the more abstruse assignment of developing standard units of knock intensity measurement; in type of equipment served, from tail packing compounds for torpedoes to fuel for giant bombers; and in operating conditions, from gasoline stability determinations under desert conditions of 120 F temperatures to aviation fuel volatility tests at sub-zero temperatures in Alaska.

Plan Foundry Report On Brass and Bronze

SAE will soon round out its recommendations to Army Ordnance covering controls of foundry practices with a technical report entitled "Process Control of Brass and Bronze Foundry Procedure."

Technical reports and recommendations are intended to help Ordnance and industry insure greater uniformity in various kinds of castings and thus far include process control of aluminum castings, gray iron, malleable iron, and steel castings. These recommendations were of great help to Ordnance inspectors and to the more inexperienced foundries which came into the business as a result of the war.

They are now available through the SAE Special Publications Dept. as SP-8, Process Control of Aluminum Foundry Procedure, and SP-20, Foundry Process Control Procedures (Ferrous).

When completed, the new report will contain sections on the following subjects vital to uniformity in brass and foundry work:

- Composition, Properties, and Application,
- Test Bar Practices,
- Sand,
- Alloying and Melting,
- Sand Casting,
- Centrifugal Casting,
- Precision Casting,
- Salvaging,
- Inspection.

On the SAE Brass and Bronze Castings Committee handling this important project are the country's outstanding authorities on the subject. They are as follows: J. M. Crawford, Technical Board sponsor, General Motors Corp.; W. E. McCullough, chairman, Bohn Aluminum & Brass Corp.; W. Romanoff, vice-chairman, H. Kramer & Co.; D. Anderson, Bohn Aluminum & Brass Corp.; D. M. Bigge, Chrysler Corp.; J. W. Bolton, The Lunkenheimer Co.; Elio DeCapite, City Pattern Foundry & Machine Co.; H. W. Dietert, Harry W. Dietert Co.; W. W. Edens, Ampco Metal, Inc.; C. E. Evans, Sandusky Foundry & Machine Co.; G. J. Foss, Universal Castings Corp.; J. C. Fox, Doehler-Jarvis Corp.; J. C. Friedel, Jr., Ano-Color Engineers; J. Gurski, Ford Motor Co.; H. F. Hagemeyer, Castings Patent Corp.; H. Hodge, Titan Metal Mfg. Co.; F. H. Mason, Chrysler Corp.; R. W. Parsons, The Ohio Brass Co.; P. J. Potter, Federal-Mogul Corp.; H. S. Ream, Jr., Shenango-Penn Mold Co.; V. Reid, Jr., City Pattern Foundry & Machine Co.; A. T. Ruppe, Bendix Products Division; H. M. St. John, Crane Co.; H. G. Schwab, Bunting Brass & Bronze Co.; S.

SAE NOMINEES FOR 1947

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Consulting Engineer, Tractor Division,
Allis-Chalmers Mfg. Co.

Treasurer.....B. B. Bachman
Vice-President, in Charge of Engineering,
Autocar Co.

Membership on SAE Council

Term of 1947-1948

Marcus L. Brown, Jr.
President, factory manager and director, Seiberling Rubber Co. of Canada, Ltd.

Elmer McCormick
Chief Engineer,
John Deere Tractor Co.

Charles H. Miller
Export Service Manager,
White Motor Co.

THE following men were elected to serve on the Council for 1946-47: ALBERT J. BLACKWOOD, Assistant Director, Research Division, Esso Laboratories, Standard Oil Development Co.; C. E. FRUDDEN, Consulting Engineer, Tractor Division, Allis-Chalmers Mfg. Co.; A. E. RAYMOND, Vice-President, Engineering, Douglas Aircraft Co., Inc. Serving on the 1947 Council as Past-Presidents will be L. RAY BUCKENDALE, Vice-President, in Charge of Engineering, Timken-Detroit Axle Co.; and J. M. CRAWFORD, General Assistant to C. L. McCuen, General Motors Corp.

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Vice-President and General Manager
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Chief Engineer, Chance Vought Aircraft Division, United Aircraft Corp.

Aircraft-Powerplant.....Carl T. Doman
Vice-President, Director, Chief Engineer, Aircooled Motors, Inc.

Body.....Rudolph I. Schonitzer
Proprietor, Schonitzer Engineering Co.

Diesel Engine.....George M. Lange
Engineer, Fuel Injection Division, Ex-Cell-O Corp.

Fuels & Lubricants.....John M. Campbell
Research Engineer, Research Laboratories Division, General Motors Corp.

Passenger Car.....W. H. Graves
Executive Engineer, Packard Motor Car Co.

Production.....Stephen Johnson, Jr.
Assistant Sales Manager, Bendix-Westinghouse Automotive Air Brake Co.

Tractor & Farm Machinery..B. G. Van Zee
Chief Engineer, Automotive Div., Minneapolis Moline Power Implement Co.

Transportation & Maintenance.....D. K. Wilson
Superintendent, Automotive Equipment, New York Power and Light Corp.

Truck & Bus.....Schuyler A. Jeffries
Chief Engineer, Truck Division, Studebaker Corp.

Woodard, Gar Wood Industries, Inc., and J. DeGroat, Consultant, Detroit Arsenal – OCOD, Detroit.

CRC Reorganizes

THE Coordinating Research Council, Inc., in its recent reorganization for peacetime operation, has replaced its Coordinating Equipment Research Committee by three Coordinating Research Advisory Committees:

(1) Diesel Engine-Equipped Vehicles Committee,

(2) Aircraft and Aircraft Engine Committee, and

(3) Gasoline Engine-Equipped Vehicles Committee.

The Coordinating Equipment Research Committtee, in the original organization of the Council in May, 1942, was one of three technical committees among which the technical activity of the Council was divided. The other two were the Coordinating Fuel Research Committee, formerly the Cooperative Fuel Research Committee, and the Coordinating Lubricants Research Committee, which on its formation took over certain SAE Lubricants research activities.

Because of the wartime diversion of interest from design developments for civilian usage, the chief function of the Coordinating Equipment Research Committee from its formation until V-J Day was cooperation with the other two technical Committees, reviewing and assisting in their programs and reports, and ensuring proper consideration of the viewpoint of the equipment industry. With the refocussing of attention on civilian needs, it was felt that the enlarged interests of the equipment industry would be better served by having specialized committees serve each of its three branches, diesel engine equipped vehicles, aircraft and aircraft engines, and gasoline engine equipped vehicles.

Each of the three Coordinating Equipment Advisory Committees express the viewpoint of equipment manufacturers on projects in which the original interest arises from the petroleum industry, and will indicate whether or not the projects recommended for prosecution by other two technical committees should properly be classed as cooperative in accordance with the bylaws of the CRC, the extent of participation that may be expected from equipment manufacturers, and the specific test procedures, equipment, or committee organization that should be used in developing the equipment phase of a given project.

Concentrating on the technical phases of research, the Council does not concern itself with the making of standards or the holding of public meetings, leaving such functions to existing qualified organizations, but does develop test procedures to be made available for reasearch purposes.

Two Section Governing Boards Hold Initial Meetings

Committee chairmen were appointed, and meetings dates, places and programs discussed as Northern California Section's Governing Board met July 16

Southern New England Section policies for the coming year were formulated at the Board's August 7 meeting. Student paper award was voted, with prizes totaling $100 to be awarded to students of engineering schools within the Section's area

Unveil Enemy Advances In Helicopter Design

PROGRESS made by German engineers in the field of helicopter design will soon be made available to American industry through the efforts of SAE Committee S-2, Helicopters, of the Special Aircraft Projects Subdivision.

For the past six months, the Committee has sponsored a project on the translation of all available German papers on helicopter design, much of which is new to the art in this country. The Committee has been extremely successful in obtaining the services of colleges, helicopter manufacturers, and interested engineers in the translation of these valuable reports. Reproduction of the translated works is being carried on under the auspices of the Army Air Forces Technical Intelligence Section at Wright Field.

To Prepare Booklet

After receiving the individual translated reports from Wright Field, the Committee plans to prepare a booklet including all the reports. The proposed booklet will be divided into five parts and will contain introductory material for each section explaining the contents. The specially prepared booklets will be distributed to all committee members and to individuals who cooperated in the translation of the material. Upon their completion, individual papers will be made available to other interested parties by Wright Field and should prove revealing to helicopter technicians.

Performance Characteristics

Another project of interest to helicopter engineers concerns itself with the formulation of standardized methods for determining helicopter performance characteristics. A subcommittee consisting of aerodynamicists, under the chairmanship of J. P. Perry, G & A Aircraft, Inc., is to prepare a report on the various methods now being used in the industry to compute performance characteristics. Items of concern to this group involve load factors and flight conditions relative to design configurations.

Standardization of Methods

Industry-wide standardization of methods for determining helicopter performance characteristics is the Committee's ultimate goal.

Along the same lines of integrating helicopter design, Chairman R. H. Prewitt reports that the Committee has agreed to coordinate a project on preparation of symbols used in design of rotary wing aircraft for the NACA Helicopter Committee. Replies to a questionnaire sent to the committee members will be summarized and submitted as an SAE Committee S-2 recommendation to the NACA.

Members are particularly grateful to Sikorsky Aircraft for the courtesy extended to them at the last Committee meeting at Bridgeport. Not only were they conducted on an interesting tour through the plant, but they were each given a ride over Bridgeport in Sikorsky's 5-place helicopter, the S-51 – one of the two commercially licensed helicopters in this country, the other being the Bell Model 47.

turn to p. 29

Investigations Find Sludge Cause in Engine Temperatures . . .

Oil Is Neither Sole Cause Nor Cure-All

Digest of paper

By CARL W. GEORGI

Quaker State Oil Refining Corp.

■ Pittsburgh (Oil City), May 17

(Part II of a paper entitled "Engine Sludge Deposits – Causes and Remedies")

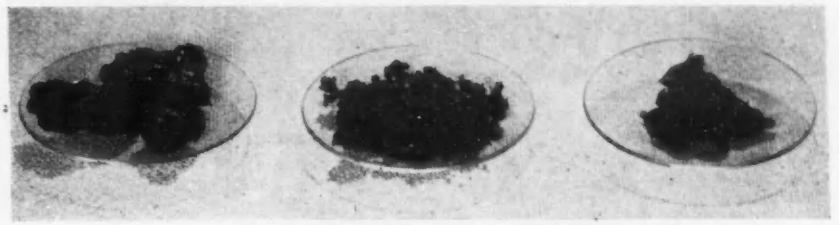

Fig. 1 – Three types of sludge found in engines: hard, lumpy, coke-like sludge; grainy sludge; and soft, pasty sludge

THROUGH the welter of customer complaints and oil marketers' extravagant claims a few clear facts about sludge formation are discernible, Mr. Georgi reported. Oil is not a cure-all; sludge deposits have several causes, and are a definite part of the engine designer's problem; and an alleviation of sludge troubles will depend much upon proper temperature and ventilation.

That this latter is true can be seen from an examination of the process by which sludge is formed. Water, which is sufficiently troublesome as a contaminant to nullify the special detergent or dispersive virtues of heavy-duty oil, may condense on cool cylinder walls in a cold running engine, mix with the oil film and wash down into the crankcase; or it may seep from the cooling system through blown cylinder head gaskets or cracks in the head or block castings.

Iron and silica result from normal engine wear and road dust. Principal source of resins, recent studies have shown, is fuel itself. Notably in light or moderate service, crankcase oils usually show some percentage of fuel dilution – unburned fuel which has, in washing past the pistons, been subjected to high temperatures and pressures in the engine combustion chambers and cracked, partially oxidized or chemically altered in some other way. Further oxidation and change produced in the crankcase may cause fuel to form gums and resins.

Fig. 1 shows the three types of sludge found in engines. The principal distinction is in the relative quantities of water and oil, and soot, carbon, lead salts and resins. Soft, pasty sludge is formed in the initial phase, under low temperature conditions, when blow-by contaminants begin to coagulate and separate out as sludges. Once formed, they may gradually dry out to bake into hard lumpy masses. Process is accelerated in engines which must operate part time in light service, part time in heavy.

Analytical data collected from 640 crankcase oildrains from miscellaneous representative vehicles showed the average engine's oil to contain, in addition to oil:

Fuel dilution	1-5%
Water	Trace – ½%
Solid Contaminants	Trace – 2%
Resins	Trace – ½%

Some contained up to 5% fuel dilution, up to more than 3% water, more than 5% solid contaminants, and more than 2% resins.

Viscosity loss, which occurred in varying degrees up to 50% in all but 2% of cases in another test with drain samples of 264 different car, truck and bus engines, is directly related to fuel dilution, because of low fuel viscosities. Excessive dilution may cause the oil to lose half or more of its viscosity, thus interfering with adequate engine lubrication. Heavy-duty oils, he said, have sufficient detergent properties to hold resins and contaminants in dispersion, but only up to a reasonable percentage.

Remedies for excessively high rates of oil contamination, therefore, require outside aid for these otherwise effective oils. Theoretically simple, Mr. Georgi remarked, these remedies nevertheless are difficult to apply practically. Single necessary solution is to make the engine run warmer . . . a minimum jacket coolant temperature of 140 F is needed to keep down condensation of combustion gases on cylinder walls, and oil temperatures of at least 140 F to allow volatile contaminants which do accumulate to be purged from the crankcase.

Thus an important cause of oil contamination evolves from hyperzeal in avoiding overheating. In moderate or light duty service, overcooling may occur, so that the engine cylinder walls act as condensers for combustion gases; oil films may collect water, unburned fuel, soot, carbon and lead salts, and wash down past pistons into the crankcase. If crankcase temperature is low, these contaminants cannot be purged out through the ventilating system. Since ventilating systems, too, are designed for optimum function at fairly high road speeds, blow-by contaminants accumulate in the crankcase.

Fig. 2 illustrates the operating temperatures usually encountered in various parts of a typical engine cooling system. Heat dissipates through the cylinder head, and coolant temperatures are high. The hot coolant then flows to the radiator top, cooling down almost to atmosphere temperature as it reaches the bottom. The cold liquid flows to the lower part of the cylinder block, and, since little heat is dissipated through the cylinder walls, the coolant warms very little until it reaches the head again.

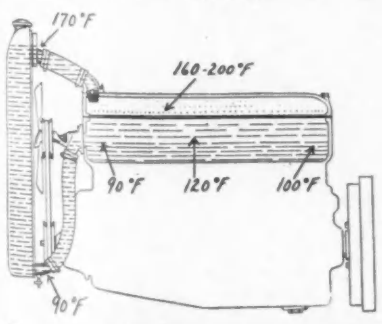

Fig. 2 – Operating temperatures normally found in various parts of an engine cooling system

To cure sludge trouble, he recommends:

1. Installation of high-set thermostats to keep the coolant as hot as possible.
2. Radiator shutters over the lower part of the radiator to lessen cooling.
3. Shielding to deflect the oil blast from the crankpan, or insulation of the crankpan, in order to develop higher oil temperatures.
4. Insulation of the valve gallery, push rod or rocker arm compartment covers if sludge accumulations are found at any of these points.
5. Frequent inspection of engine ventilating system and cleaning out of intake and outlet.
6. An oil drain schedule allowing removal of oil before sludge can reach concentrations sufficient to form sludge.
7. Frequent checking of ignition and carburetion to maintain good combustion and keep mixture sufficiently lean.

Necessity for these modifications should eventually be eliminated, Mr. Georgi feels, when a more widespread understanding of the causes of sludge formation leads engine makers to design for adequate jacket and crankcase temperatures in light and moderate service. The oil industry, he said, is already prepared for the severer requirements which will be imposed on oils by these improved sludge-resistant engines.

Design Logic Claimed For Rear Engine Car

Digest of paper

by W. B. STOUT

■ Annual Meeting, Jan. 8

(Paper entitled "What Motor Cars Should Be")

LOOKING ahead to postwar passenger car design, Mr. Stout observes that rational engineering demands a rear engine installation; and utility-wise, a roomier interior is called for with present external dimensions.

His reason for the rear engine installation stems from a simple and apparent principle, namely: the most weight should obviously be over the wheels that have to push the car; the least weight on the wheels which the driver's muscles must steer. The more weight over the driving wheels, the more traction or horsepower available. The less weight over

Fig. 1—An example of roomy interior design for passenger cars is that of the Scarab car which has two loose chairs and can easily accommodate a card table

the steering wheels, the less work the driver will have to do, particularly in emergencies.

In the north country, they carry sand bags in the luggage space all winter so that cars will have sufficient traction at the rear to be controllable on icy roads. It makes better sense, he feels, to put the engine in the back where the weight belongs rather than to carry parasite dead weight of sand bags to hold the wheels down.

When the weight is in front, as in standard cars, front wheels bury in the mud and drag while the rear wheels on top lose the traction to push the car forward, and can only use a fraction of the horsepower the engine delivers. With the weight in the back, however, the rear digs in for better hold and traction, while the front end on top of the ground is easily steered with little resistance or work.

In front engine types, when brakes are set on a hill or at high speed, the weight surges forward so that rear brakes become useless. Going downhill, this car weight swings forward toward the front wheels with no rear brakes. Going up hill, the car weight swings to the rear, the problem of front wheel drive.

But in the rear-engined car the weight swings forward on steep grades or at high speed to equalize all braking loads for a new type of stability and control in emergency. Not only is the steering effort far less with the weight in back, but the car steers quicker. In short, a rear-engined car steers more like a bicycle.

Present cars are 6 ft 7 in. wide outside, but more than half their length is taken up in machinery and useless space, Mr. Stout feels. Wheels should be at the ends of the car for maximum wheelbase comfort, at the same time allowing the use of 30% more length of the car for passenger space.

Every bit of space the customer purchases should be used for his comfort. By utilizing this space in a car the size of a Ford, Chevrolet, or Plymouth, one can get almost double their interior space, 20% more wheelbase, lighter weight through combined frame and body construction leading to much greater economy.

When this extra space is available, Mr. Stout foresees new luxuries for a drawing room interior such as loose chairs, card table, couch or davenport, indirect lighting, and forced ventilation. A step in this direction is his Scarab car, the interior of which is shown in Fig. 1. It has two loose chairs and can easily accommodate a card table.

New Developments Give Promise Of Easing Vehicle Maintenance

Excerpts from paper

by J. A. HARVEY

Pittsburgh Motor Coach Co.

■ Cincinnati, April 11

(Paper entitled "New Developments in Maintenance Since Pearl Harbor")

WILL post war equipment be so improved that each part will last a definite period and then fall apart like the one-horse shay, requiring no service or car in the meantime? While there is no reason to believe that any such radical change will take place for many years, some very great improvements in materials, methods, instruments, tools, and personnel training have been developed during the war that will greatly influence the future maintenance of all automotive vehicles.

Among the new materials recently developed is a porous chrome coating for cylinder sleeves and piston rings. This process has improved the life of these parts on airplanes, and tests now being run on buses indicate more than normal life. Various hard coatings such as stellite have been used on valves, valve seats, transmission pilot bearings, and water pump shafts giving greatly increased life. Metallizing has been used to form rust protective coatings and non-impact coatings successfully.

Greatest efforts have been made to obtain better bearings and bearing materials. Solid aluminum shell type bearings were tried and, although kind to the shaft, failed at low mileage from loss of crush. Experiments are now being conducted with coined aluminum bearings and with aluminum-coated steel back bearings to increase the compressive strength. None of the thin coated steel backed bearings using babbitt, tin, and silver worked well when subjected to the heavy duty and high pressure of bus service. These bearings all failed from fatigue, spalling of the coating or separation from the steel backs, subjecting the shafts to destructive wear from contact with the steel shells.

A new type bearing of sintered material known as the moraine bearing has been recently introduced which has been giving excellent service on diesel engines. It is composed of nickel-copper with a thin babbitt facing of 0.003 to 0.005 in., compressed or coined under very high pressure. Examination of one of these sets of bearings after 52,000 miles of service showed no perceptible effect on shaft finish nor any measurable wear.

One of the many new tools developed for war production which will help greatly in the shop is a self-contained line boring machine, shown in Fig. 1, more accurate than older equipment as to boring alignment. It is equipped with a hydraulic feed, giving a smoother finish, and helps the mechanic to obtain accuracies as close as ±0.00025 in.

A new engine cooling fan has been perfected with movable blades and thermally controlled pitch, so that only as much air as is required to maintain a constant temperature is pulled through the radiator and blown over the engine. It is claimed that this type fan, illustrated in Fig. 2, will save as much as 10 to 15% engine output by reduced fan drag and will also maintain more even temperatures, reducing sludge tendencies, gasoline consumption, and maintenance.

Heaters originally developed for airplanes are now available for vehicles. On one type, the gasoline line between the fuel pump and the carburetor is tapped with a line to the heater. The fuel is ignited by a spark plug in the heater, so that the only attention required is to turn the heater on or off. These heaters are capable of producing heat immediately and in very large Btu capacities. They should reduce heater complaints and maintenance in extreme climates or where engines are idling.

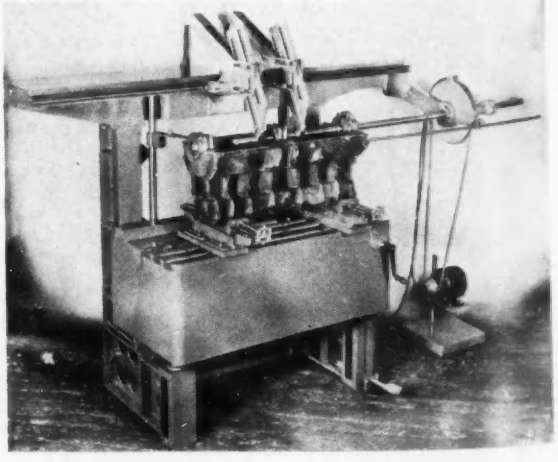

Fig. 1—The self-contained line boring machine, a tool developed for war production, is more accurate than older equipment as to boring alignment and permits accuracies as close as plus or minus 0.00025 in.

Desert tests run by the Army under full load and average temperatures of 130 F proved closed water systems effective and efficient. Whereas additions of water averaged several gallons of water per day and overheating was so great speeds were limited with conventional cooling systems, closed water systems installed using a 4 lb release pressure limit permitted running of the trucks at full power, under load, without overheating, and with a water consumption of only a few pints per day per truck.

Tests have since shown that the increase in cooling efficiency of approximately 20% comes principally from an increase in pump efficiency – by having pressure instead of vacuum on the intake side to assure faster circulation. Buses equipped with this system have operated quite satisfactorily. Several, particularly notorious for constant overheating, before conversion, now give excellent results.

This system together with a visible water level indicator lends itself to use of treated water, reducing deposits and assuring improved engine efficiency.

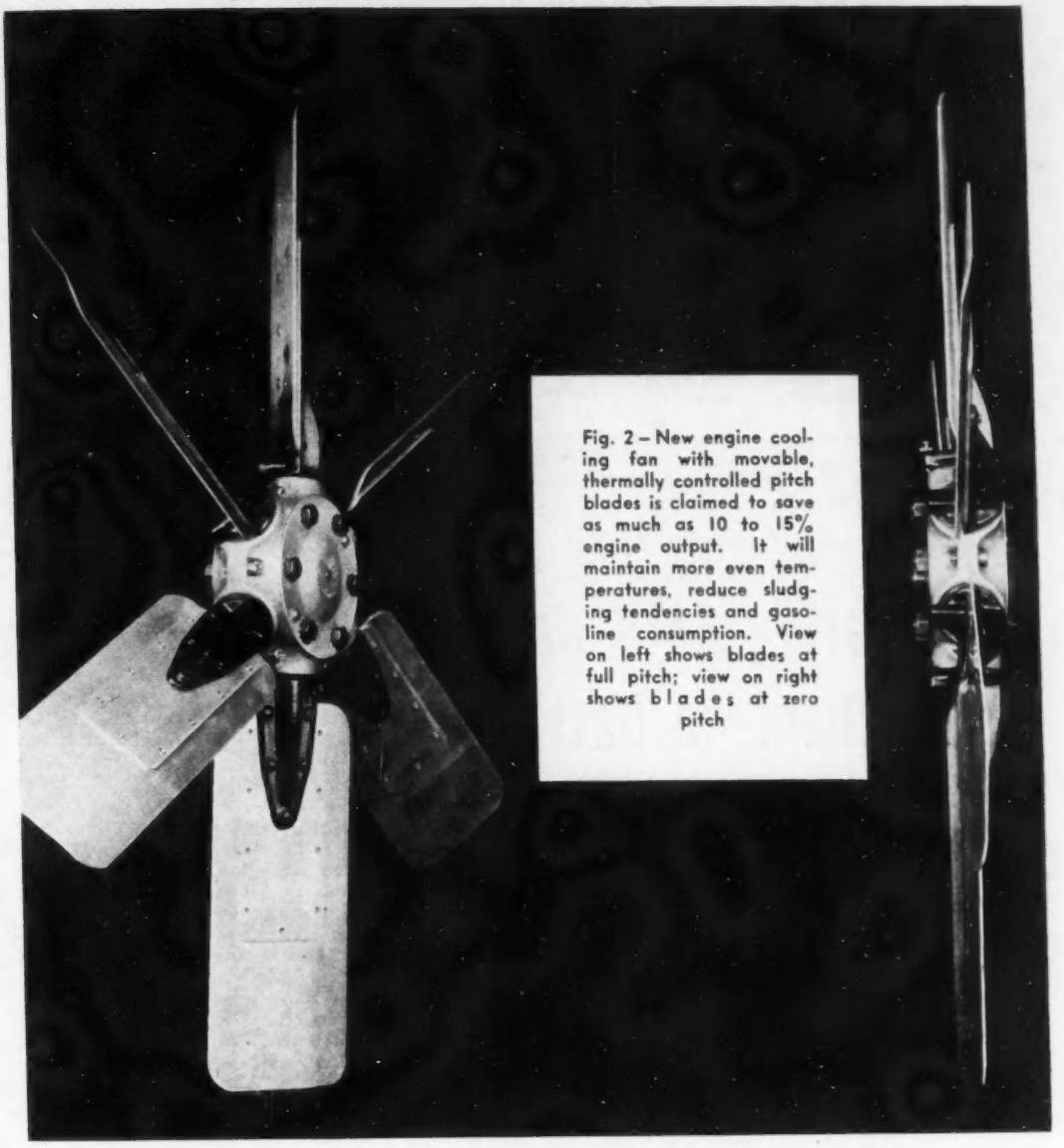

Fig. 2 – New engine cooling fan with movable, thermally controlled pitch blades is claimed to save as much as 10 to 15% engine output. It will maintain more even temperatures, reduce sludging tendencies and gasoline consumption. View on left shows blades at full pitch; view on right shows blades at zero pitch

The difficult parts cleaning problem for maintenance men should be remedied by two recent developments. First, a self-contained high pressure steam cleaning machine has been developed that mixes the solution in the gun with only clean water in the heating coil. This reduces scale formation, prolongs the life of the coil, and permits the use of very strong and effective cleaners. The second innovation is a cold soaking solution which will not damage any metals used in an engine or its accessories. It has a wetting action that softens carbon and grease in one-half hour or less, allowing it to be easily rinsed away and leaving the part as clean as new.

Prior to the war, some wheel-type dynamometers had been developed using a generator for the absorption unit and electric fans to force air through the radiator and prevent overheating. While these instruments were satisfactory, their installation and construction were costly. Manufacturers have recently turned to hydraulic absorption units with closed temperature-controlled systems to maintain constant controlled loads. These hydraulic-type dynamometers give all the data required to determine maximum power and efficiency settings on the vehicles at a cost approximately one third that of previous electric models.

A new recording type accelerometer has recently been developed for power testing vehicles on the road. To set power and braking rates on street cars and buses, the instrument is used to record acceleration, deceleration, mph, and distance traveled. These data are obtained from the plotted time and distance curve by means of an interpolation diagram placed over the curve.

War Maintenance Critical

In 1942, with so many military vehicles disabled in the United States and allied countries, it was discovered that there weren't enough men or materials to win the war if some means of vehicle conservation could not be found. A committee appointed by the President to study the problem recommended a mass production maintenance system as a permanent solution.

Selecting the best features of several mass maintenance systems then in use, a pilot plant was created and placed in operation in three months. The plant was designed to overhaul thousands of vehicles per month; and labor operations were so specialized that mechanics could be trained in six days. Machinery was shipped all over the world. Crews consisting of approximately 3500 men each were shipped overseas to man these plants after only two weeks of classroom work and actual plant operation. After only a few months' operation of these plants, the "vehicle down" problem disappeared.

Based on actual production records of the mass maintenance pilot plant, it is estimated that the cost of overhauling a medium sized passenger car engine and its transmission, such as the Buick, would be approximately $26. The total cost including freight, labor of removal and installation would be about $75. The customer would receive for this price a powerplant as good as new.

Several large companies are seriously considering establishing plants of this type for exchange motors and other units as soon as normal conditions return. If this plan is carried out, we may find our future maintenance plans largely centered around servicing and unit replacement, rather than unit rebuilding as at present.

Servicing Revamps For Postwar Market

DEPRESSION and war as well as prosperity have proved automotive servicing to be a stable income producer: when vehicles are plentifully available, total volume of work is large; and when new vehicles are unobtainable, average repair orders are high in dollar volume.

Two Pittsburgh Section authors recently reviewed some of the problems of this under-equipped industry, evaluated progress already made, and suggested important improvements still to be undertaken. (*E. D. McKean,* Allegheny County Motor Co., "Trends in Service Station Management," and *R. L. Paulson,* General Motors Corp., "Dealer and Fleet Service Plants.")

The depression, Mr. Paulson said, helped to focus attention on the importance of service as a source of income. Many dealers devoted more space to service, but little new building was done. With a few operating revisions, a smaller number of dealers were able to cope with more customers.

Mr. McKean pointed out that if present sales volumes are to be maintained, service stations will have to double the number of customers accommodated, and increase shop productivity sharply. Efficient shop layouts, provision of adequate shop space, and retooling with latest equipment were mentioned as requisite to increased shop productivity.

Recommendations

Specific recommendations, based on surveys of available space and admitted needs, are

• Service control systems, for the interrelation and control of all shop functions: blackboards cataloging work to be done, route sheets, dispatch systems, intercommunication systems. Startling increases in labor sales volume were reported after service control installations – through better workmanship, increased shop productivity, customer satisfaction.

• Careful accommodation of stall dimensions – some to maximum requirements, some to different requirements – for greater efficiency with given space.

• Improvements in methods of surfacing concrete floors for resistance to salt damage, better reflection of light, less susceptibility to dust accumulation.

• Localized lighting systems for more illumination on working surfaces at lower cost.

• Revamping of color schemes to enhance lighting and improve appearance.

Note of caution was injected by Mr. Paulson, who urged avoidance of overexpansion, suggesting careful examination of the long-term potentialities of the business.

Engineering Skill Key To Mechanized Battle

MECHANIZED warfare created wide and varied engineering problems. The demands were staggering – often unlike anything ever before encountered. Saving lives and winning battles called for prompt solutions. Convention was often tossed to the wind and ingenious short cuts resorted to. It was results that counted; results were produced.

Industry kept supply lines flowing with materiel demanded by the military. Where battle needs made on-the-spot modifications necessary, soldier-technicians came through with an uncanny know-how.

The gigantic proportions of technology at war cannot be documented in any one place at any one time. Many facts from the war fronts were brought to SAE Section meetings by men who had been in the thick of it. Long after the fighting has stopped, the facts remain to interest stay-at-homes. In following paragraphs have been integrated data selected from four talks given just before the end of the 1945-1946 Section-year. Drawn upon for information were these talks: "Petroleum's Part in Winning the War" by *E. J. Gay,* Ethyl Corp. (Canadian Section); "Report on Army Vehicles" by *Col. L. L. Beardslee,* U. S. Army (So. California); "My Experience in the European Theater" by *Lt.-Col. L. J. Grunder,* U. S. Army Ordnance (So. California); and "AAF Radar in Combat" by *N. J. Winter,* Army Air Forces (Dayton).

VEHICLES . . .

KEEPING army vehicles running under extreme climatic conditions and over all types of terrain when they were first exposed to the rigors of combat called for quick thinking.

The African campaign caused trouble in British vehicles, mainly due to low alloy valve steels and the use of high lead fuels and non-detergent oils. American Army engineers spent two months with the British working out modifications of exhaust valves, valve guides, and clearances. Instructions to British repair depots were prepared and new steel and valves were ordered from the United States. The result of this program was an increase of top overhaul periods from 3500 to 15,000 miles.

From the desert, the war wended its way to cold country in France at the foot of the Alps. Winter temperatures of —10 F were expected. With diesel tanks spearheading the big push, it was difficult to pour Middle East type of diesel fuel out of drums at 15 F. These tanks were fitted with high velocity guns to knock out the German Mark V and VI Tiger tanks and it was vital to have proper fuel.

After field trials, a 17% mixture of kerosene was found satisfactory from the standpoint of allowable exhaust smoke and required power and fluidity. The fuel was mixed in Marseilles and the operation was kept on schedule.

Maintenance in combat was a difficult proposition. Vehicles had to be kept running even after absorbing terrific punishment. If spare parts were not available, they were fabricated in maintenance shops. At one time it became impossible to secure cam shaft gears. To overcome this, an electro-plating generator was made from the generator of a Lincoln Arc Welder. The steel crank gear was chrome plated to an oversize, then mated with the worn cam gear so that the lash between the cam and crank gear was no greater than 0.005 in.

PETROLEUM . . .

EARLY in the war, production of 100/130 grade aviation gasoline in the United States and Canada was 50,000 bbl per day – just a drop in the bucket compared to what the AAF needed to "keep 'em flying." Something had to be done and done quickly to step up output. It was.

At that time, 3 cc of tetraethyl lead per gal was used in 100 octane gasoline. The lead content was raised to 4.6 cc per gal. As a result, the yield per day was increased by 13%! Output in June, 1945, climbed to 525,000 bbl per day.

While production problems were trying, delivery of gasoline to combat areas was even more perplexing – until the engineers went to work. Battle zones were constantly changing. War has a strange knack of being located in out of the way areas with little or no transportation facilities. Typical is the China-India-Burma Theater. Without the 1800-mile pipeline from Calcutta through Burma into China, the Ledo Road could not have been built.

These invasions pipelines were of light wall sections either 4 in. or 6 in. in diameter. The sections were short enough to be loaded on ships and light enough to be handled by two men. Pumping stations were placed 3 to 10 miles apart, depending upon the grade of the line. From the day they were completed, these lines ran 24 hr a day, 7 days per week, the bloodstream of our war machine.

RADAR . . .

THE black magic of radar gave "eyes" to the submarine as well as the airplane. Radar served as a searching device in submarine warfare. During the period of May to July, 1943, 65 enemy U-boats were sunk with the aid of radar.

Weather no longer menaced effectiveness of bombing operations. Particularly helpful to the ground forces was tactical pre-invasion bombing along the coast of France. Bad weather or smoke did not obscure Air Force targets from radar-equipped airplanes. Navigation was materially improved through radar. A system was developed by which the position of an aircraft could be quickly determined despite the complications of weather. This was equally important to the Navy in ship operations.

turn to p. 25

Vehicle Maintenance Simplified With New Chemical Cleaners

Excerpts from paper

by RAY SANDERS
Turco Products, Inc.

Annual Meeting, Jan. 7

(Paper entitled "How Chemistry Simplifies Automotive Cleaning Methods and Procedures")

FACTORS such as water, fuel, grease, exhaust gases, and dirt continually expose the automotive machine to chemical and physical attack which affects its appearance, mechanical functioning, and service life. Modern cleaning measures taking advantage of chemical developments should be utilized by the passenger car owner and fleet operator to preserve and recondition the surfaces of automotive equipment.

An effective procedure for cooling system cleaning, for example, should combine mechanical means for agitation to dislodge entrapped solids and heavy sludge, with chemical cleaning for the removal of grease, oil, rust, scale, and corrosion.

Equipment has been devised which coordinates these requisites of cooling system cleaning. The Rabloc flushing unit, Fig. 1, consists of a solution tank and a specially designed tank which permits the direction of flow of the cleaning solution to be changed at will. Agitation is provided under controlled pressure. The cleaning solution is first circulated in the direction of normal flow, then in the reverse direction. This "reverse flushing" forces the solution into the pockets that may be sealed off by deposits and removes particles that close narrow passages from the normal direction of flow.

Circulation is provided by attaching one hose to the block and a second to the radiator. The flushing unit tank is charged with an alkaline cleaning solution which is circulated through the entire cooling system. The direction of flow is periodically reversed to give a "reverse flushing" action. The system is then drained and rinsed.

If heavy or obdurate coatings of scale or rust remain, a mildly acid solution is circulated through the cooling system with "reverse flushing." Following the acid treatment, the system should be neutralized with a short circulation of the alkaline material.

Preventive Measures

After the cooling system is once cleaned, a treatment that will prevent the recurrence of rust, scale, and corrosion should be initiated. Chemical compounds are available which, when added to the cooling water in small quantities, bring to a halt the process of oxidation, electrolytic corrosion, and the precipitation of hard-water scale. The use of such materials will do much to prevent the gradual loss of heat-transfer efficiency through scaling and rusting.

A filthy engine is a hazardous engine as oil and grease present in large amounts are inflammable. Oil and grease also deteriorate wiring insulation and may cause shorts and other electrical and ignition troubles. Two methods are available for cleaning the engine and chassis, neither being time consuming or costly.

The first method requires a simple air pressure sprayer and facilities for water, or water and air, rinsing. An emulsifying cleaner, mixed with petroleum solvents, is sprayed on the work to be cleaned. Petroleum solvents used alone leave a film of oil on the work that is difficult to remove with rinsing.

The second method of engine and chassis maintenance cleaning involves the use of a specialized piece of equipment, the chemical vapor cleaner. The device, shown in use in Fig. 2, is essentially an arrangement in which water, combined with cleaning solution, is pumped into heating coils, raised to a high temperature, and discharged under pressure through a specially designed gun in the form of penetrating spray. The combined effect of heat, moisture, pressure, and detergent serves to detach grease and dirt deposits with great speed.

Either of these methods is applicable for cleaning specialized automotive equipment such as tractors, cranes, road-building equipment, and street sweepers.

Film that dulls the luster of automotive finishes is basically an oil and grease film which serves as a binder for particles of dust, clay, and other solids. Water alone will not remove the oil and grease. A number of detergents, harmless to many coatings, is available which remove, with little effort and complete safety, not only dust and particles, but also oil, grease, and oxidized paints. Periodic cleanings of the finish with such materials will both improve the appearance and do much to prolong its life.

Removal of paint coatings in preparation for refinishing is another process to which chemistry is making a valuable contribution. Until recently, the stripping of paint was a hazardous and difficult undertaking. Considerable research devoted to this problem has resulted in development of effective paint removers now available.

One such remover will destroy the adhesion of securely bonded automotive coatings in from 5 to 15 min. It is non-inflammable, relatively non-toxic, slow to volatize, and successfully removes a great variety of coatings. As shown in Fig. 3, both the remover and the loosened paint are rinsed off with water, leaving the surface clean and free of residue.

DISCUSSION

Disagreement with Mr. Sanders' cooling system and maintenance was voiced by Hoy

Fig. 1—Raybloc cooling system cleaning unit circulates and "reverse flushes" chemical cleaning solutions under controlled pressure so that grease, sludge, rust, and scale are removed.

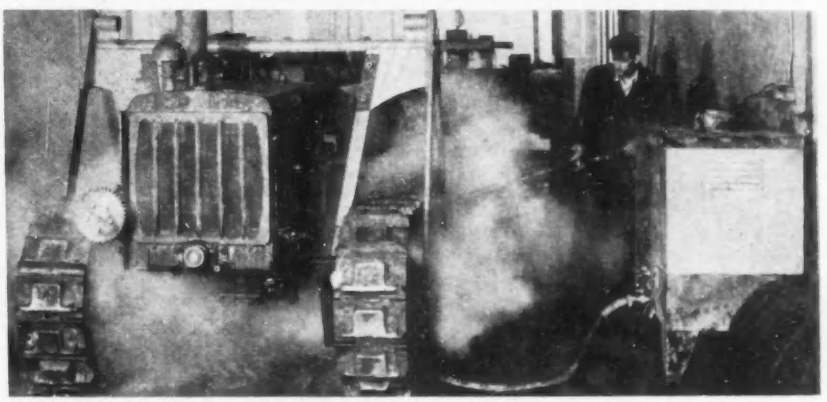

Fig. 2—Chemical vapor cleaning is effective in cleaning engines and chassis as well as specialized automotive equipment such as tractors and road-building equipment. It is particularly suitable for installations where a large amount of equipment must be maintained

Fig. 3 – A new chemical paint remover causes colloidal swelling and blistering of the paint. As shown on the right, a stream of water applied to the surface has washed off the loosened paint, leaving the surface free of residue and ready for repainting

Stevens, American Trucking Associations, Inc. To clean the inside of the radiator, he advised, hot alkali cleaner should be circulated through the radiator when grease or oil emulsions are present. It has also been his experience that when grease comes from the water pump bearings, there will be found an accumulation of fine fragments of water pump packing. These particles are not reduced by the alkali cleaner. The surest cleaning is done when the bottom tank of the radiator is removed and the tubes are "rodded" with a rod about 25% smaller in diameter than the inside of the tube.

Hard water scale and rust formations, Mr. Stevens found from experience, should be removed at the time of engine overhaul. This job has been done by his organization with a mixture of acids containing an inhibitor against attack on cast iron, steel, copper, and brass. Apparently the inhibited acid mixture etches out the ferrite and leaves the graphitic content of the cast iron in a film over all exposed iron surfaces.

To keep the tin solder from being attacked by the acid mixture, a head gasket was used to limit the circulation of the hot acid mixture to the engine block and cylinder head water passages.

★ ★ ★

Engineering Perseverance Nurtured Jet Propulsion Creator's Dream

Digest of paper

by AIR COMMODORE FRANK WHITTLE

Royal Air Force, England

Metropolitan, July 15 — No. Calif., Aug. 15
So. Calif., Aug. 13 — Oregon, Aug. 16
Chicago, Aug. 21

(*Paper entitled "The Early History of the Whittle Jet Propulsion Gas Turbine"*)

IF jet propulsion appears suddenly to have blossomed forth as a new mode of air travel, Air Commodore Whittle points out that the road to its development was often rocky, the engineering obstacles almost insurmountable, and the final goal at times seemingly unattainable.

Looking back at the disappointments and the discoveries that impeded and inspired the small group of pioneers led by Commodore Whittle discloses interesting facts on turbo-jet engineering.

First version of the present turbo-jet engine appeared in 1930 as a British patent filed by the author, then a Royal Air Force cadet. In spite of the pessimism then prevalent that low efficiencies of turbines and compressors were inevitable, he was convinced that big improvements in efficiencies were possible. Factors favorable to jet propulsion application not present in other applications which prompted him to further study its possibilities were:

1. Low temperatures at high altitudes made possible a greater ratio of positive to negative work for a given maximum cycle temperature;
2. A certain portion of the compression could be obtained at high efficiency by the ram effect of the forward speed, raising the average efficiency of the whole compression process;
3. Expansion taking place in the turbine element of such an engine was only that necessary to drive the compressor and, therefore, only a part of the expansion process was subject to turbine losses.

Design of the first engine based on Commodore Whittle's original patent was started in 1936. It was designed with an optimistic but specific target in mind. The aim was to propel a clean little airplane weighing about 2000 lb at about 500 mph and at an altitude in the order of 70,000 ft, although the engine itself was not to be a flying model. This speed was estimated to correspond to that of minimum drag at that altitude, or the most economical speed at that altitude.

The engine was to be a simple jet propulsion gas turbine having a single-stage turbine with bilateral intakes, driven by a single-stage turbine directly coupled. Combustion was to take place in a single combustion chamber through which the working fluid passed from the compressor to the turbine.

Commodore Whittle and his colleagues were going beyond all engineering experience in the specifications set for each of the major components. They were aiming at a 4:1 pressure ratio in a single-stage centrifugal blower when at that time, so far as is known, a ratio of 2½:1 had not been exceeded. Another goal was a breathing capacity in proportion to size substantially greater than had previously been attempted. The combustion intensity considered was beyond achievements of that day.

A double-sided compressor was selected to obtain both the greatest possible breathing capacity in proportion to size and to give a reduced proportion of skin friction losses. To keep the blade loading as low as possible, as many blades as manufacturing limitations would permit were used. It was hoped that by keeping the pitch-chord ratio of the rotating guide vanes small, stalling would be avoided at the intake. Commodore Whittle still believes that this is one of the main sources of loss in centrifugal compressors.

The turbine nozzle arrangement was very unorthodox as no nozzle blades were used. The idea was that most of the expansion took place in the convergent-divergent entry to the nozzle scroll which was shaped to cause the discharge of the gases through whirl velocity corresponding to that of a free vortex, that is, constant angular velocity. This nozzle scroll was the source of considerable controversy; although it was a good idea at the time, it has since been discarded.

Design of the rotor assembly needed much careful thought. It was considered necessary to use unbored forgings for both the turbine wheel and compressor impeller, and to use an overhung turbine rotor as it was thought that the provision of a satisfactory bearing support on the exhaust side of the turbine would be very difficult. The bearing house assembly which contained one of the two water jackets for the turbine cooling could not be split in the diametral plane. These considerations governed the rotor design.

Testing First Engine

For test purposes, the engine was mounted on a 4-wheeled trailer. The trailer also carried the starter motor, instrument panel, and controls, making the whole set self-contained, except for the fuel supply from the fuel tank and the water supply. It was intended to measure the thrust by a spring balance connecting the trailer to a fixed abutment, but no thrust measurements were taken in testing the first model.

The very first attempt to start was successful in that the engine ran under its own power; but it accelerated out of control up to about half its designed full speed. This happened several times, and altogether it was a very alarming business . . . so much so that in the early days individuals in the vicinity did more running than the engine.

Fuel lines were frequently broken during various motoring tests so that there was often a "lake" of fuel in the combustion chamber. Other uncontrolled accelerations were caused by sudden opening of the

burner needle valve after initial sticking and by loss of temper in the burner spring through overheating. Fortunately, none of these uncontrolled accelerations took the engine beyond about 9000 rpm.

No trouble was ever experienced in starting, except when the ignition failed through cracked electrodes or when mistakes were made in the assembly of the fuel lines.

Overheating of the burner already referred to was a serious problem. As a result of it a change was made to downstream injection. Five runs were then made with this system, up to maximum speeds of about 8500 rpm, but the control was so bad that this speed could not be exceeded. Any further opening of the control seemed to result only in more burning of the fuel aft of the turbine. Although other configurations were tried, combustion continued to be a vexing problem.

Pressure Delivery Sub Par

Damage to the compressor and impeller casing was only slight; but it had now become clear that the delivery pressure from the compressor was much below expectations. It was then decided to fit diffuser blades in an effort to improve the blower performance before further testing. A speed of 13,000 rpm was then attained, but the compressor performance still left much to be desired.

And so it went with other features too. The tests had been very disappointing, but there were many encouraging observations. For one, it was demonstrated that there was no particular difficulty in starting or in control. There was also much evidence suggesting that the whole scheme was well worth developing, though much hard work lay ahead. Principal defects of the first design were shown to be:

1. Poor compressor efficiency;

2. Excessive preheating of the air to the rear intake owing to the disposition and temperature of the combustion chamber;

3. Very unsatisfactory combustion;

4. Excessive frictional loss in the unorthodox turbine nozzle scroll.

A second experimental engine was then built in which it was hoped to eliminate the "bugs" experienced in the first. An interesting discovery made by Commodore Whittle during the development of the design of the second engine was that his theory of vortex flow in the original bladeless turbine nozzle scroll was not impractical as results from the first tests seemed to indicate. It was his original intention to provide a rotating annular flow of constant angular momentum. He believed that this was the effect aimed for in any case in normal practice. It was well known that, in theory at least, ideal flow from a constant nozzle ring should be one of constant angular momentum.

Practice and Theory Differ

He was astonished to find that, on the contrary, it was general practice to assume that the flow from a turbine nozzle ring was considered to be a series of straight jets of substantially constant velocity and pressure. It appeared that the blades of the first turbine had been provided with blade angles based on standard practice; though they had a substantial twist, this was only to allow for the radial variation of the blade speed.

Care was then taken to ensure that the nozzle and turbine blades used in the second model were designed to conform to a flow of constant angular momentum from the nozzle ring. This meant that there was twice as much twist on the blades as there was before. This concept of vortex flow is now fairly well established and is accepted by some manufacturers as the basic practice in turbine design.

Both the second and a third engine were built before the turbo-jet was considered sufficiently advanced to power a flying airplane. The first flight engine was known as the W1. It was installed in an airplane designed by the Gloster Aircraft Co., and flown for the first time on May 14, 1941. The program of flying tests laid down was completed in 14 days without an incident.

The astonishment of those observing the first flight tests was great. One British officer explained to a puzzled bystander who could not comprehend an aircraft sustained in flight without propellers, "That's easy, old man. It just sucks itself along like a Hoover." Another was certain that the airframe concealed a Merlin engine driving a small 4-bladed propeller.

But jet propulsion was truly proven as a new powerplant of the future airplane. It was this engine, the W1, that was the forerunner of the many successful turbo-jets built both in this country and abroad. It has ushered in a new era in air transportation which promises to make the world a smaller and a very different place to live in.

Demand Driver Comfort In Truck Cab Design

Digest of paper

by O. F. QUARTULLO

Visioneering Co., Inc.

■ Annual Meeting, Jan. 8

(*Paper entitled "The Driver's Comfort"*)

TRUCK engineers' laxity in design of cabs for driving comfort is decried by Mr. Quartullo. Driver discomforts in trucks have been a malignant evil, and he feels it is high time effort is increased to improve this condition.

One comfort violation is that the driver is seated in the wrong position relative to the driving functions he has to perform, although some cab-over-engine models are exceptions. This is due primarily to location of the steering gear. Standard steering gears procured from steering gear manufacturers have to be mounted inside the main frame, forcing the driver to sit toward the center of the cab instead of to the extreme left. To operate properly and to have clear vision for driving forward and backing up, the driver should be able to put his head out of the window and have an unobstructed view.

An example of the ideal arrangement is that of the locomotive engineer. He has a clear view ahead of him and to the rear. Certainly the truck driver, whose steering and control problem is much more difficult, is entitled to this same advantage. These proposed changes entail engineering and a possible slight additional cost; but the benefits accruable are well worth it, says Mr. Quartullo.

Vision has been further handicapped in some cab designs by the unavailability of safety glass in widths wider than 28 in. The engineer has been penalized in his design by being forced to use the size of glass he could obtain without cost penalty.

Open to greatest improvement is the driver's seat. The average truck seat costs $13 to $16 and is called upon to be comfortable under severe riding service, to handle individuals of variable weights and sizes, and in some cases to support a man for 8 to 10 hr. It is impossible to produce a comfortable seat operating under these conditions at this cost. Airplane, bus, and railroad industries think nothing of spending the necessary money for comfort of the occupant. Yet no seat is subjected to greater wear, tear, and abuse than is the truck seat.

Another item Mr. Quartullo mentions is cab construction and suspension. Quite often the cab is mounted on a three-point suspension to become flexible over rough terrain. The steering gear assembly is rigidly fixed to the main frame and the steering column is rigidly supported to the flexing cab and subjected to forces imposed by the cab. He feels that the steering column should be rigidly supported on the same main frame as the steering gear, free from cab action.

Many other features are poorly designed, neglecting driver comfort. Although such a list would be long, it is worthwhile to mention much needed items such as ventilation, defrosting of side windows, proper door closures by rubber seals and properly fitting doors, and even balance of brake and clutch pedal pressures.

Many of today's faulty designs can be traced to small production on most truck models which do not warrant tooling and production fixture costs necessary to produce a comfortable cab. But these additional costs should not hinder improved design. Driver comfort and satisfaction is important because no manufacturer can hire a better salesman than an enthusiastic and satisfied driver.

DISCUSSION

More comfortable seats are now available, says V. H. Hoehn, U. S. Rubber Co. Foam rubber is a product that can be controlled and engineered to give the degree of seat ride desired. This can be done by varying the density and coring to give the desired feel and supporting power to the cushion unit. He is convinced that a full depth foam unit will satisfy the following seat "musts" for driver comfort:

1. Upholstery and cushioning material must be basically comfortable;

2. Complete seat cushion and back must give good support in minimum space;

3. Complete assembly should show a weight saving and increased payload, and

4. It must give long service and keep original contour.

A. M. Boor, Monroe Auto Equipment Co., feels that the seat designer is greatly handicapped in his effort to design a comfortable seat. Only after the mock-up of the fuel tank is made is the seat designer called in. Frequently there is insufficient room left to put in a seat of adequate width to comfortably accommodate the driver.

He questions the possibility of ever producing a seat which by itself will prevent road shocks from reaching the driver. To give good results, the seat should be suspended on suitable springs and properly controlled by a shock absorber.

There are advantages in mounting the steering column entirely independent of the cab, agrees L. A. Stewart, Mack Mfg. Co. Support problems would be involved, however, if desirable column strength is to be achieved enabling the driver to lift his weight by the steering wheel. He suggests a steering column attached to a flexibly supported cab by means of a rubber insulated collar. This would actually provide a desirable control of movement for prevention of "ride sickness."

Mr Stewart advances as the reason for neglect of driver comfort the maximum payload consideration of truck operators. With legislation limiting overall vehicle length, manufacturers have been forced to shorten the cab, particularly those of conventional type trucks, resulting in the driver being "jack-knifed" into the cab.

Advocates Truck Design For Foreign Needs

Digest of paper

By ALEX TAUB
Matam Corp.

■ Milwaukee, Nov. 2

(Paper entitled "An Engineer Wanders from Home")

HAVING lived in England, travelled in China, and worked with Government agencies during the war period, Mr. Taub feels he has built up a viewpoint on truck requirements that should benefit manufacturers with an eye on international markets.

For trucks of the future he predicts:

- Larger trucks in volume production,
- Greater durability,
- Engines tuned to mpg,
- Short corrosion-proof sleeves, and
- Positive drive differential.

Trend of size is upward for trucks, says Mr. Taub. This is a direct result of the war. Before the war the 1½-ton truck was the only size really mass-produced and the only truck that enjoyed volume distribution. The 2½-ton truck was produced in great volume during the war. Many who never looked beyond the 1½-tonner are now convinced that it can do a job and is the truck they want. It promises to give a better result for investment, and when American truck companies will eventually mass-produce it, they will make a lighter and better 2½-ton truck than the present models.

Durability in trucks has always been tailored to meet requirements. Roads in Europe and the U. S. have been so improved to reduce the need for protection against shock that truck suspensions have been improved not by redesign, but by standing pat. But in countries where road travel is tough, trucks shake off the tinware and natives use the material for reinforcing their shabby houses. Fundamentals of styling need reconsideration from the standpoint of housing the truck's innards and keeping the housing in place.

General reaction to American trucks abroad is that everything appears to be about ⅛ in. too small, except springs; they appear to be about 5 in. too short. Mr. Taub is certain that the company that sets out to reinforce its trucks against this kind of usage will have the lion's share of the export business.

Gallons of fuel per ton-mile is bound to be a more serious factor in the future. In countries today where fuel is the number one problem, a diesel – even at greater cost – is preferable in order to lower fuel consumption. The gasoline engine truck has a firm hold on the trucking business and must improve fuel consumption to keep this advantage. Fuel consumption improvement lies mainly in small things quite often ignored. Two-speed axles will save on fuel in down hill driving. Automatic shift, change in spark-plug type, position, and gap to burn a lean mixture, and larger overlap between exhaust and intake are also recommended for greater fuel economy.

Corrosion, although lighter in the U. S. than in Europe, is nevertheless with us. It definitely follows cylinder wall temperatures. The further away from the water entry, the less the cylinder wall will wear or corrode. Corrosion is local and can be offset by a special anti-corrosion metal short sleeve in the top of the bore.

Watching trucks slithering in slime in China, it was obvious to Mr. Taub that a locking differential of positive drive differential was needed. Required is a positive drive on both wheels, yet fully compensating on turns. No matter what it costs, it will be cheaper and easier to service than a 4-wheel drive and will be just as effective. Why should traction be lost with one wheel still on good ground? It is time this flat spot in the transmission line be eliminated.

Fuel Economy High For Diesel Trucks

Digest of paper

by J. A. WATTS
Cummins Engine Co.

■ Cincinnati, Nov. 8

(Paper entitled "The Application and Use of High Speed Diesel Engines in Trucks")

A 100% advantage in mpg of the diesel-powered truck over the gasoline truck is claimed by Mr. Watts. The truck operator who realizes the extent of diesel operating economy and selects the proper diesel engine for his job imposes a number of problems upon the manufacturer of custom-built diesels. Reflected in the design of each engine component must be the operating conditions peculiar to the truck in which the engine is to be installed.

Mr. Watts is careful to point out that the diesel specific fuel consumption at full load and most economical engine speed will not indicate a saving of 100% in mpg. But, he continues, the exceptionally high specific fuel consumption on the gasoline engine at partial throttle is familiar fact. Since partial throttle operation is very frequent on truck operation, the 100% savings indicated is plausible.

Tests run on both a diesel and a gasoline engine revealed the diesel thermal efficiencies to be greater by the following:

- Full Load – 22%
- ¾ Load – 45%
- ½ Load – 56%
- ¼ Load – 100%

How much this means in actual fleet operation can be seen by examining specific cases. Mining operation trucks with 275 hp engines have shown a 25% load factor based on possible maximum fuel consumption. The load factor indicates the extent of partial throttle operation. In the case of east coast over-the-highway trucks of about 45,000 gvw, a load factor of 50% based on fuel consumption was observed. The potential saving in the number of gallons per trip times the differential between diesel fuel and gasoline cost becomes an imposing figure.

What goes on behind the scenes in the diesel manufacturer's engineering department paints a picture of the effort involved in producing the best engine for a specific job. Studies are made of mountings, air cleaners, radiation, and gears – just a few of the many engineered components.

Rubber mountings not only isolate engine vibration, they also eliminate wear points on the front and rear engine mountings. Mounting location is a problem and factors entering into this determination are increased horsepower requirements, transmission requirements, and weight. Found to be the best approach is a rear engine support located on the clutch housing to produce a zero bending moment at the point of flywheel housing to engine attachment. This becomes a "must" with fluid couplings.

The air cleaner selected must be of proper size to give high efficiency with a minimum of air restriction. All of this work can be nullified by using too small a connection between the cleaner and engine, or by using poor bends which do not give streamlined flow and thus increase the restriction. A physical fact to which Mr. Watts calls attention is the 3% power loss per 1000 ft of elevation. Since one inch of mercury equals 1000 ft of altitude, losses resulting from a poorly designed inlet connection would penalize a vehicle with a higher altitude operation than that actually encountered.

Sufficient radiation is usually provided for hot climate operation. But most of the trouble arises in designing specially radiated vehicles to a particular geographical location which later may be changed. About 5 to 7% of rated engine horsepower is allocated to fan requirements. Approximately 5 sq in. of frontal area per rated horsepower is required. In the few instances where fan horsepower requirements have been increased to reduce radiator size, the vehicle was penalized with reduced payload and increased fuel consumption.

Selection of the best gear ratio combinations for transmissions and rear axles is no simple chore. There is no single piece of equipment which will meet all the operating conditions encountered in various localities and types of work. The trend is toward larger units to obtain a minimum ton-mile cost of operation. Optional ratios are available on these larger units. Field experience has shown incorrect application to reduce drastically the unit service life.

An illustration of the need for a unit tailored to operation is a recent west coast stock-haul having a high operating road speed with a satisfactory ratio for highway operation and "starting the load" gear range. Trouble was encountered in picking up the load in a muddy ranch yard.

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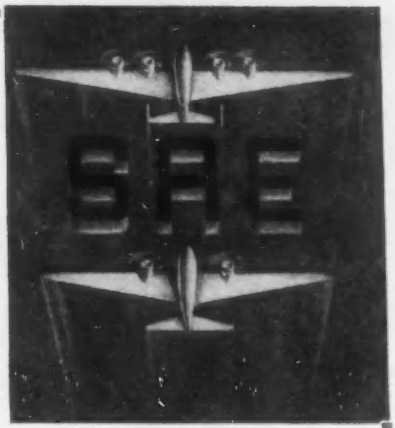
OCTOBER 3-5

National AERONAUTIC Meeting

Biltmore Hotel
Los Angeles



■ THURSDAY, OCTOBER 3

Morning

Aircraft Powerplant

J. L. Ryde, Chairman

Automatic Control Considerations for Propeller Drive Aircraft Gas Turbines
– C. W. Chillson, G. P. Knapp, and M. Meyer, Propeller Division, Curtiss-Wright Corp.

The Future of Automatic Power Controls
– G. W. Newton and W. K. Klose, Boeing Aircraft Co.

Air Transport

E. F. Burton, Chairman

The Future of the Gas Turbine in Air Transportation
– F. W. Kolk, American Airlines, Inc.

Weight Saving Can Be Expensive
– B. J. Vierling, Pennsylvania-Central Airlines

Afternoon

Aircraft

O. E. Kirchner, Chairman

Analysis of Transport Aircraft Cabin Air Conditioning Requirements with Special Reference to Air Freshness, Temperature and Humidity Control
– B. E. Del Mar, Douglas Aircraft Co., Inc.

Air Conditioning of Turbine-Propelled Military Aircraft
– H. J. Wood, Airesearch Mfg. Co.

Aircraft Powerplant

N. C. Price, Chairman

The Evolution of the Pulse-Jet Engine and Its Future Prospects
– L. B. Edelman, Aerodynamic and Thermodynamic Specialist

Effect of Combustor-Inlet Conditions on Combustion in a Turbo-jet Engine
– J. H. Childs, R. J. McCafferty and O. W. Surine, National Advisory Committee for Aeronautics

Evening

General Aircraft Powerplant

I. L. Shogran, Chairman

Factors Producing Erratic Engine Operation
– A. L. MacClain, United Aircraft Corp.

■ FRIDAY, OCTOBER 4

Morning

Aircraft

Ray Smith, Chairman

Design of a Transport Airplane Electrical System
– M. H. Peairs, Douglas Aircraft Co., Inc.

The Effects of High Altitude on the Operation of Aircraft Electrical Apparatus
– H. H. Howell, Boeing Aircraft Co.

Air Transport

E. E. Miller, Chairman

The Effect of New Civil Air Regulations on Scheduled Air Transportation
– R. W. Ayer and F. F. Fennema, American Airlines, Inc.

Designing to New Transport Category Requirements of the Civil Air Regulations
– W. B. Oswald, Douglas Aircraft Co., Inc.

Afternoon

Aircraft

G. A. Page, Jr., Chairman

The History and Development of the B-29
– E. C. Wells, Boeing Aircraft Co.

Aircraft Powerplant

M. O. Teetor, Chairman

Development of Chrome Plated Piston Rings for Aircraft Engines
– John Minnich, Wright Aeronautical Corp.

Oxygen Boost of Engine Power at Altitude
– Francis Masi, Naval Air Material Center; E. F. Fiock, National Bureau of Standards; and R. A. Grosselfinger, DeLaval Steam Turbine Co.

Low Tension Ignition – A System of Merit
– J. K. Rudd, Wright Aeronautical Corp.

Evening

General Aircraft

A. L. Klein, Chairman

Plans for Industrial Air Preparedness
– Brig-Gen. John C. Gordon, Deputy Commanding General of the Air Materiél Command for Plans

A New Approach to the Flight Problem
– W. B. Stout, Consulting Engineer

Motion Pictures: *Studies of Insect and Bird Flight, contributed by Insect and Rodent Control Section of the Army Service Forces and The Sperry Corp.*
"Aeronautical Oddities" contributed by Air Materiel Command..

■ SATURDAY, OCTOBER 5

Morning

Aircraft

J. L. Atwood, Chairman

Simplified Structures for Low Cost Airplanes
– A. Z. Boyajian, Republic Aviation Corp.

Postwar Aircraft Industry Cashes In on Wartime Experience
– H. N. Gilbert, California Institute of Technology

Air Transport

J. S. Martin, Chairman

Passenger Comfort in High Speed Transports
– P. E. Brice, Republic Aviation Corp.

What the Airline Passenger Doesn't Want in Airplane Design
– R. W. Rummel, Transcontinental and Western Air, Inc.

CORRECTION

The caption for Fig. 3 on p. 27 in the June issue of the Journal, of the article entitled "Tank Trucks and Suspensions Found Soundly Engineered," from a paper by Tore Franzen, describes the illustration as "the 30-ton Panther tank." The illustration shows a picture of the Tiger 1 tank and should have shown the Panther instead.

Hawaii Announces Year-Round Meetings

HAWAII Section's Board of Governors voted, July 1, to hold 12 meetings each year. July 15 meeting was attended by 42 members. Speakers were W. J. Maze, agricultural engineer with C. Brewer & Co., Ltd., and Virgil E. Weiss, automotive engineer, fuels and lubricants, Standard Oil Co. of Calif. Mr. Maze's illustrated talk on "The Development and Use of Crawler Type Machinery in Plantation Field Work" included a comprehensive history of crawler type machinery. Mr. Weiss, visiting from Northern California Section, told members about the 1946 Summer Meeting at French Lick, and delivered a paper on "New Developments in Preventive Maintenance for Truck Fleet Operations."

SAE Coming Events

Meeting	Date	City	Hotel
● Tractor	Sept. 11-12	Milwaukee	Hotel Schroeder
● Aeronautic Meeting and Aircraft Engineering Display	Oct. 3-5	Los Angeles	The Biltmore
● Transportation & Maintenance	Oct. 16-17	Chicago	Knickerbocker
● Fuels & Lubricants	Nov. 7-8	Tulsa	Mayo
● Air Transport Engineering	Dec. 2-4	Chicago	Edgewater Beach

Canadian – Sept. 26

Hamilton Golf and Country Club, Ancaster; golf 1:00 p.m., dinner 7:00 p.m. Automotive Developments as Influenced By the Race Track – Wilbur Shaw, Indianapolis Motor Speedway Corp.

Chicago – Sept. 16 and 20

Sept. 16 – LaSalle Hotel, South Bend; dinner 6:30 p.m. An Independent Four Wheel Suspension Using Rubber Torsion Springs. Speakers: A. S. Krotz, chief development engineer, R. C. Austin, development engineer, and L. C. Lindblom, development engineer, all of the B. F. Goodrich Co.

Sept. 20 – Westward-Ho Country Club; dinner 6:00 p.m. SAE Playday; Golf, Entertainment, and so forth. Golf Tournament – 1:00 p.m.

Cleveland – Sept. 9

Carter Hotel, dinner 6:30 p.m. The Roll of Detonation Waves and Auto-Ignition in Spark-Ignition Engine Knock as Shown by Photographs taken at 40,000 and 200,000 Frames per Second – C. D. Miller, member of Fuels & Thermodynamics Division, Aircraft Engine Research Laboratory, National Advisory Committee for Aeronautics.

Detroit – Sept. 30

Horace H. Rackham Educational Memorial Bldg., dinner 6:30 p.m. High Speed Photography of Combustion – C. D. Miller, Aircraft Engine Research Laboratory, National Advisory Committee for Aeronautics. Heat and Sound Insulation – Lawrence M. Ball, director of electronics laboratory, Chrysler Corp. Dinner Speaker: Ross Mulholland, Station WJR, Watch the Spots Go By.

Indiana – Sept. 12

Antlers Hotel, Indianapolis; dinner 6:45 p.m. Jet Propulsion – T. S. McCrae, assistant chief engineer.

Metropolitan – Sept. 19

Pennsylvania Hotel, New York; meeting 7:45 p.m. Auto-ignition and Detonation Waves – C. D. Miller, Aircraft Engine Research Laboratory, National Advisory Committee for Aeronautics.

Milwaukee – Sept. 13

Ozaukee Country Club; Annual Golf Tournament. Golf begins 10:00 a.m. dinner 6:30 p.m.

Northern California – Sept. 10

Engineers Club, San Francisco; dinner 7:00 p.m. Heavy Duty Tires – Past, Present and Future Design and Performance - J. J. Robson, Firestone Tire & Rubber Co. Motion Picture - The Building of a Tire.

Southern New England – Sept. 18

Chance Vought and Sikorsky Aircraft Divisions, United Aircraft Corp., Bridgeport; dinner 6:00 p.m. Coffee talks by executive engineers from Chance Vought and Sikorsky Aircraft Divisions, United Aircraft Corp. Inspection Trip at Chance Vought – 2:30 p.m. to 3:30 p.m. Inspection trip at Sikorsky – 4:15 p.m., also flight demonstration. Plant visitations for citizens of United States only and by prior reservations.

Virginia Group – Sept. 16

William Byrd Hotel; dinner 7:00 p.m. Subject – The Immediate Outlook on Parts and Improvements To Come in the Near Future. Speaker to be announced.

Student Branch News

On July 11, the SAE Student Branch of the California Institute of Technology heard a very interesting talk on the subject of "European War Developments in the Petroleum Industry" by Lt.-Col. L. J. Grunder of the Richfield Oil Co. As an officer who had met and solved many problems in connection with petroleum during his war experience, he talked from first hand information.

One of the first problems he was called on to solve was the adoption of a single fuel for all ground-force use. A second problem encountered was oxidation of fuel stored in steel drums of small capacity,

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September Check List of SAE Meetings Papers

The following papers, divided into four general categories, presented before National and Section Meetings of the Society of Automotive Engineers, Inc., are now available in mimeographed form to SAE Members for 25¢ each and to Non-Members for 50¢ each.

Ten or more mimeographed papers by any one author are available at reduced rates. Photolithographed reproductions of SAE Journal articles, and photostatic copies of older SAE Meetings papers can be made at cost, upon request from the Special Publications Department, Society of Automotive Engineers, Inc., 29 West 39th Street, New York 18, N. Y.

NEW PAPERS

Check Here	Author	Title of Preprint of Paper	Date of Presentation
	Allen, L. H. Borger, J. G.	Air Transport Selection	April 3-5, 46
	Archer, R. S.	A Post War View of Alloy Steels	June 2-7, 46
	Banker, O. H.	Ten Years' Experience with Automatic Transmissions in the Bus Field	Aug. 22-24, 46
	Bartholomew, E.	Potentialities of the New Fuels in the Design of Passenger Car Engines	June 2-7, 46
	Bassett, M. B.	Evolution of a New "Workhorse" Airplane for the Airlines	April 3-5, 46
	Beaubien, S. J. Cattaneo, A. G.	Piston Lubrication Phenomena in a Motored Glass Cylinder Engine	June 2-7, 46
	Beier, Arthur	Aircraft Engine Starters	June 2-7, 46
	Bingman, R. E.	Design: Accidentally or on Purpose	June 2-7, 46
	Bixby, W. D. Werner, R. M. Earl, H. H.	Truck Design from the Viewpoint of the Operator Engaged in Local Trucking and Delivery Service	June 2-7, 46
	Bollinger, L. L.	Airport Costs and Air Carrier Responsibilities	May 23, 46
	Bolz, R. E.	Graphical Solution for the Performance of Continuous-Flow Jet Engines	June 2-7, 46
	Borland, John	Power Requirements of Self Propelled Implements	Sept. 11-12, 46
	Cass, Robert	Engines and Fuels for Future Buses and Trucks	April 11, 46
	Chaddick, H. F.	Motor Carriers' Viewpoints on Equipment Design	June 2-7, 46
	Colby, J. M.	The Tank-Automotive Design Engineer Moves to the Front	March 4, 46
	Darrin, H. A.	Does Styling Control the Design of Cars	March 25, 46
	DeHaven, J. C.	The Development of Magnesium Alloys as Aircraft Materials	April 3-5, 46
	Doman, C. T.	Fuel and Lubricating Oil Requirements for Personal Planes	April 3-5, 46
	duPont, Stephen	Some Interesting Features of the German Motorcycle Industry's Developments	June 2-7, 46
	Evans, R. D.	Pneumatic Tires for Modern Airplanes	April 3-5, 46
	Fry, A. S. Stone, J. Withrow, L.	Analysis of a Shock-Excited Transient Vibration Associated with Combustion Roughness	June 2-7, 46
	Gilmer, L. A.	Diesel Engine Requirements for Farm Tractors	Sept. 11-12, 46
	Gleason, E. B.	Latest Developments in Bevel Gears	Feb. 18, 46
	Gross, W. A., Jr. Elliott, A. D.	Traction as Influenced by Soils and Their Condition	Sept. 11-12, 46
	Gwinn, J. M., Jr.	Simplifying the Airplane for the Private Owner	April 3-5, 46
	Hall, N. A.	The Fuel-Air Ratio Required for Constant Pressure Combustion of Hydrocarbon Fuels	June 2-7, 46
	Heitshu, D. C.	Load Reactions, Weight Transfer and Operational Effects Resulting from the Mounting of Implements on Tractors	Sept. 11-12, 46
	Holby, J. C.	Development of the Air-Cooled Diesel Engine	Sept. 11-12, 46
	Horine, M. C.	Current Motor Bus Development	March 18, 46
	Hungerford, J. D. Colthar, J. W.	Airline Scheduling	April 3-5, 46
	Hunsicker, H. Y. Kempf, L. W.	Aluminum Alloys for Bearings	June 2-7, 46
	James, T. L.	Inter-City Bus Design from Operators' Viewpoint	June 2-7, 46
	Kent, S. R.	Cyclone 18 Performance in Combat Areas	June 2-7, 46
	Kerley, R. V.	Light Aircraft Service Experience with All Purpose Fuel	June 2-7, 46
	Keyser, P. V.	Recent Developments in Universal Gear Lubricants	June 2-7, 46
	Krotz, A. S. Austin, R. C. Lindblom, L. C.	An Independent Four Wheel Suspension Using Rubber Torsion Springs	June 2-7, 46
	Lederer, J.	For Whom the Bell Tolls	April 3-5, 46

Check Here	Author	Title of Preprint of Paper	Date of Presentation
	Lundquist, W. G. Cole, R. W.	Performance Characteristics of the BMW003 Turbojet Engine and a Comparison with the JUMO 004	April 3-5, 46
	Madle, A. M.	German Automotive Development —Air-Cooled Engines	June 2-7, 46
	Mathes, J. C. Rottmayer, E.	A Summary of Design and Test Experience with Monocoque Magnesium Wings	April 3-5, 46
	Mathewson, R. C.	German Automotive Developments Diesel Engines and Injection Equipment	June 2-7, 46
	McDougald, A. F.	Objectives in Motor Coach Design for Urban Service	June 2-7, 46
	Miller, C. D.	Detonation Waves and Auto-ignition in Spark-Ignition Engine Knock	June 2-7, 46
	Neyhart, A. E.	Which Driver for the Job	June 2-7, 46
	Norelius, E. F.	German Automotive Developments (Power Trains, Clutches, Transmissions and Steering Mechanisms	June 2-7, 46
	Nourse, Hal E.	Economic Factors in Air Transportation Which Will Control Profits in 1946 and 1947	June 2-7, 46
	Oehrli, J. W. Jandasek, V. J.	Investigation of an Opposed Piston Light Aircraft Engine	April 3-5, 46
	Pinkel, B.	MACA Study of the Utilization of Exhaust Gas of Aircraft Engines	April 3-5, 46
	Pomeroy, L.	Performance of European Economy Cars	June 2-7, 46
	Pope, A. W., Jr.	Summary Report on German Automotive Gasoline Engines	June 2-7, 46
	Prokosch, W.	The Planning of Cabin Interiors for Transport Aircraft	April 3-5, 46
	Putt, Col. D. L.	German Developments in the Field of Guided Missiles	March 7, 46
	Rodgers, T. V.	The Motor Truck's Job Along the Eastern Seaboard	June 2-7, 46
	Ruge, Dr. A. C. Meier, Dr. J. H. Gibbons, C. H.	Equipment for Separately Measuring Power In Cylinder Shaft, Threshing Machinery & Sickle Bar Components of Combine Harvesters	Sept. 11-12, 46
	Ryde, J. L.	The Two Cycle Engine in Aircraft —The Crankcase Scavenge Target Engine	April 3-5, 46
	Saunders, L. P. Rogers, P. S.	Aluminum Brazing Development	June 2-7, 46
	Schrodt, P. J.	Bus Garage Layout and Design	Aug. 22-24, 46
	Shaw, Milton C. Nussdorfer, T. J.	A Visual Study of Cylinder Lubrication	June 2-7, 46
	Sheasgreen, J. C.	A Logger Looks at Trucks	Aug. 22-24, 46
	Simi, H. E.	Design Features of Modern Buses	Feb. 7-8, 46
	Snead, J. L. S., Jr.	Truck Design for Intercity Service in the Western States	June 2-7, 46
	Solomon, S. J.	Simplifying Terminal Problems	June 2-7, 46
	Stein, E. W.	The Future of Rubber in the Automotive Industry	April 11, 46
	Stone, J. M. Underwood, A. F.	Load-Carrying Capacity of Journal Bearings	June 2-7, 46
	Swart, G. H.	Classification of Rubber and Rubber Compounds	June 2-7, 46
	Templin, E. W.	Shop Layout and Equipment for a Large Fleet	June 2-7, 46
	Thayer, W. W.	Proof Testing the DC-6 Air Conditioning System for Passenger Comfort	May 3, 46
	Thorsen, W. T.	Fleet Maintenance	Dec. 14, 45
	Watkins, G. B. Ryan, J. D.	Automotive Glazing With Plastics	June 2-7, 46
	Watson, R. A. Thill, W. E.	Practical Aspects of Sleeve Bearing Materials	Aug. 22-24, 46
	Weir, E. T.	Which Way Americans	April 22, 46
	Willey, A. O.	Low Speed, High Torque Testing of Gear Lubricants for Hyphoid Axles	June 2-7, 46
	Wolf, Austin M.	German Automotive Developments (Chassis Developments in the German Automotive Industry	June 2-7, 46
	Zwahl, C. E.	High Speed Testing of Gear Lubricants for Hyphoid Axles	June 2-7, 46

Papers Previously Announced

Vehicles

Check Here	Author	Title of Preprint of Paper	Date of Presentation
	Aldag, R., Jr.	Diesel Electric Locomotive Operation	Oct. 9, 45
	Ayres, Vincent	Valves and Valve Testing	Dec. 6, 45
	Belsky, J. D.	Development of a Diesel Maintenance-Training Program	May 21, 43
	Brunken, Renke	White Hydro Torque Drive	Jan. 7-11, 46
	Bryan, H. F.	Combustion in a Pre-Combustion Type Diesel Engine	Jan. 7-11, 46
	Burkhalter, R. R.	German Automotive Transmission Systems Development & Design	March 4, 46
	Cass, Robert	Motor Trucks of the Future	Jan. 7-11, 46
	Corey, Lt.-Col. C. H.	Technical Investigation of German Automotive Material	March 4, 46
	Churchill, H. E. Delp, M. Z. Hykes, P. G.	Fundamental of Suspensions	Jan. 7-11, 46
	Colwell, A. T.	Alcohol-Water Injection	Jan. 8-12, 45
	Colwell, A. T.	Fuel Requirements for Farm Tractors	Sept. 13, 44
	Davies, R. H.	Design of German Hydraulic Systems and their Components	Jan. 7-11, 46
	Deimel, A. H.	Performance of Hydraulic Transmissions	Jan. 7-11, 46
	Fairbank, H. S.	Highways of the Future	Jan. 7-11, 46
	Franzen, Tore	Suspension & Track of German Military Track Laying Vehicles	March 4, 46
	Hammond, C. F.	Steering as Affected by Suspension	Jan. 7-11, 46
	Heldt, P. M.	Transmissions Giving Uninterrupted Acceleration	Feb. 13, 43
	Heussner, C. E. Johnson, E. T.	Substitutes for Tin in Automotive Vehicles	Jan. 7-11, 46
	James, W. S.	The Perfect Automatic Transmission	Jan. 7-11, 43
	Landen, E. W.	Combustion Studies of the Diesel Engine	Jan. 7-11, 46
	Laurie, G. W. Taussig, W. A. Willett, H. L., Jr. Wilson, D. K.	Symposium - Approaches to Vehicle Retirement	Jan. 7-11, 46
	Loweke, E. F.	Power Brake Valves	Nov. 1, 45
	McCain, G. L.	Engineering of Involute Splines	Jan. 7-11, 46
	Miller, R. J.	Torque Converters	Jan. 7-11, 46
	O'Conner, B. E.	Damping in Suspensions	Jan. 7-11, 46
	Patculich, J. Blair, R. W.	Testing of Highly Loaded Sleeve Bearings	April 3-5, 46
	Qurtulle, O. F.	The Driver's Comfort	Jan. 7-11, 46
	Sanders, Ray	Cleaning Symposium - How Chemistry Simplifies Automotive Cleaning Methods and Procedures	Jan. 7-11, 46
	Schilling, Robert	Flexible or Spring Medium of Suspensions	Jan. 7-11, 46
	Shoemaker, F. G. Gadebusch, H. M.	Effect of Fuel Properties on Diesel Engine Performance	Jan. 7-11, 46
	Sinclair, J. W.	How to Drive a Truck	Oct. 28, 45
	Smith, L. H.	Motor Coaches of the Future	Jan. 7-11, 46
	Stewart, Hugh, B.	An Electrical Model for the Investigation of Crankshaft Torsional Vibrations in an in line Engine	Nov. 1, 45
	Stout, W. B.	What Motor Cars Could Be	Jan. 7-11, 46
	Super, R. K.	Review of Brake Design and Methods of Rating Brakes for Commercial Automotive Vehicles	Jan. 7-11, 46
	Taub, Alex	The Relationship of Lines vs. Shape on Miles per Gallon	June 2-7, 46
	Thorne, M. A.	German Army Vehicle Engines	March 4, 46
	Twyman, L. R.	Hydraulics as Applied to Tractors and Farm Machinery	Sept. 13, 46
	Watson, R. A.	Bearing Developments Resulting from Restrictions of Materials	Sept. 15, 43
	Weider, R. L.	Observations of Various German Suspensions and Steering Gears	March 4, 46
	Wheeler, J. W.	German Autobahn - Its Relation to German Industrial Economy & Traffic System Used	March 4, 46
	Young, F. M.	German Radiators & Oil Cooler Structures and Facilities for Manufacture	March 4, 46

Aeronautics

Check Here	Author	Title of Preprint of Paper	Date of Presentation
	Allen, Howard	Personal Flying	Oct. 10, 45
	Benedict, M. C.	Aviation Gas Turbine Installation Problems	Oct. 4, 45
	Berry, B. M. Rollins, F. S. Brandt, C. S. Weld, W. C.	Aviation Lubricating Oils Some Aspects of Under-Wing or Pressure Refueling	Aug. 24, 45 Oct. 4, 45
	Canney, F. R.	Provisions for Overwater Operation	Dec. 3-5, 45
	Chase, Capt. J. H.	Control Decks for Long Range Aircraft	Dec. 3-5, 45
	Christenson, C. M.	A Report on the Nature of Ice Formation on Aircraft as Related to Airline Operations	Nov. 1, 45
	Clyman, H. J.	Jet Propulsion & Gas Turbines in Aviation	Dec. 12, 45
	Crawford, M. B.	The Air Lines Air Cargo Problems	Dec. 3-5, 45
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	Hanley, W. V. Hundere, A.	Economics of Airline Fuel Utilization	Nov. 1, 45
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Fuels and Lubricants

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____	Adams, E. W.	Performance Testing of Wheel-Bearing Lubricants	Nov. 6-7, 45
____	Ainsley, W. G. Strehlow, W. F.	Effect of Octane Number & Volatility of Tractor Fuels on Horsepower and Fuel Economy of Tractor Engines	Feb. 12, 46
____	Alspaugh, M. L.	Gasoline Gum Tolerance of Ordnance Equipment (Report of CFR Committee)	Jan. 7-11, 46
____	Best, H. W. Ainsley, W. G. Keyser, P. V. Sabina, J. R. Jeffrey, Lt.-Col. R. E.	Symposium on Fuels and Lubricants Significance of Octane Number Progress Report on Crease Projects Improved Gear Lubricants Stable Gasoline for War and Peace Heavy Duty Oils in Military Service	Jan. 17, 46
____	Brooks, D. B.	A Review of the Development of Reference Fuel Scales for Knock Rating	Jan. 7-11, 46
____	Grieo, Com. E. F. Goddin, Lt. Com. C. S.	Significance of Cetane Number in Fuels	Nov. 6-7, 45
____	Heron, S. D.	Fuel Sensitivity & Engine Severity in Aircraft Engines	April 3-5, 46
____	Holaday, W. M.	Wartime Refinery Operations and Their Effect upon Future Motor and Aviation Fuels	Feb. 1, 46
____	Kauppi, T. A. Pedersen, W. W.	Silicones as Lubricants	Nov. 6-7, 45
____	Klein, Maj. N. L.	German Military Fuels and Lubricants	March 4, 46
____	Kratzer, J. C. Crsen, D. H. Williams, D. B.	New Synthetic Lubricants	Jan. 7-11, 46
____	Larson, M.	Diesel Fuel Additives Create New Concepts	Nov. 6-7, 45
____	Tongberg, C. O. Ellis, R. E. Baxley, C. H.	Application of Heavy Duty Additives to Aviation Oils	Nov. 6-7, 45
____	Veal, C. B.	Philosophy of Cooperative Research	Jan. 7-11, 46
____	Wolf, H. R.	Motor Oils - Regular, Premium and Heavy Duty	Jan. 7-11,46

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____	Collyer, John	Outlook for Rubber for the Automotive Industry - Synthetic and Natural	Jan. 7-11, 45
____	Dunning, Dr. J. R.	Development of Atomic Energy	Jan. 7-11, 46
____	Clen, Earl W.	Observations of the German Rubber Industry	March 4, 46
____	Crunder, Maj. L. J.	War Developments of the Oil Industry in Austria and Roumania	March 4, 46
____	Martz, L. S. Peden, W. T.	Latest Developments in Honing Techniques	Jan. 7-11, 46
____	McBrearty, J. F.	Utilization of New High Strength Aluminum Alloys	Oct. 4, 45
____	McCloud, J. L.	Methods of Specifying Materials	Jan. 7-11, 46
____	McEwen, Lt.-Col. E.	Highlights of German Tank Transmission Design & Development	March 4, 46
____	Miller, Roy A. Tatman, Max E.	Shop Aspects of the New High Strength Aluminum Alloys	Oct. 4, 45

		Members	Non-Members
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____SP-6.	Ride and Vibration Data	.50	1.00
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About S

CARL A. LINDBLOM (center) chief engineer of Volvo Motor Co., Goteborg, Sweden, who is visiting automotive plants here, with H. WILLIAM OVERMAN (left) and A. C. Teetsel, Thermoid Co. executives, at the Trenton, N. J., plant of the company. Mr. Lindblom brought with him the first Volvo car off the company's production line, shown at the left. He is discussing the procurement of American standard parts with a number of manufacturers, with hope of early revival of Sweden's automotive industry

Now deputy chief, Detroit Arsenal, **FRED B. HUNT** had been engineering representative of Continental Oil Co., Ponca City, Okla.

WILLIAM D. LAIRD has been appointed regional representative of the Research and Development Branch of the Canadian Department of Reconstruction and Supply, Ottawa. His headquarters will be in Montreal. The agency supplies technical information to industry. Mr. Laird had been a project engineer with Turbo Research, Ltd., at Winnipeg.

Ervin Motor Co., Shelton, Wash., has named **W. N. JAMESON** service manager. He had been an automotive instructor in the Mt. Ranier Ordnance Depot, at Tacoma.

WILFRED D. MERRIMAN, who had been a draftsman at the General Motors Electro-Motive Division, La Grange, Ill., is in the U. S. Army Signal Training Regiment, Londonderry, Ohio.

Until recently chief test engineer, Wright Aeronautical Corp., Lockland, Ohio, **JOHN HICKENLOOPER** is a junior engineer in the Philco Corp. refrigeration test laboratory, Philadelphia.

Discharged from the Navy recently, **REX A. HORROCKS** has returned to Pratt & Whitney Aircraft, East Hartford, as a layout draftsman.

Wright Aeronautical Corp. has transferred its operations to Wood-Ridge, N. J., from Paterson, according to an announcement by **GUY W. VAUGHAN,** president of Curtis-Wright Corp.

CHARLES OSCAR BIRD, until recently an engineer with Autocar Co., Ardmore, Pa., has joined Milford Crane & Machine Co., Milford, Conn.

Previously a structural research engineer with the Kellett Aircraft Corp., Upper Darby, Pa., **HUGH J. MULVEY** has taken a position as assistant chief of structures with the Piasecki Helicopter Co., Sharon Hill, Pa.

Upon discharge as U. S. Navy chief motor machinist's mate, **R. W. NIELSEN** returned to General Motors Institute, as instructor, product service department.

Until recently a student at Purdue University, **REGINALD S. ARNOLD** has joined the engineering department of Pratt & Whitney Aircraft, East Hartford, Conn., as a detailer.

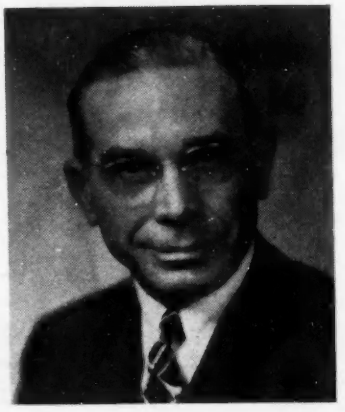
CHRISTIAN E. GROSSER has opened his office as consulting mechanical engineer in Westport, Conn. He had been vice-president and chief engineer of Standard Machinery Co., Providence, R. I.

Upon his discharge from the Navy as a lieutenant, **GEORGE LANCASTER** joined Magnolia Petroleum Co., Beaumont, Texas, as an automotive engineer.

GEORGE P. WILSON has been appointed a graduate assistant at the Agricultural & Mechanical College of Texas, College Station, where he is planning on his masters degree in electrical engineering. He was graduated recently from Tri-State College, Angola, Ind., where he had been an enrolled student.

A member of the Society for the past 25 years, **R. C. ALLAN** has been appointed director of sales of Eclipse Machine Division, Bendix Aviation Corp., Elmira, N. Y. Starting in the industry with Thos. B. Jeffery Co., prior to the acquisition of that company by Nash Motor Co., he went with Stromberg Carburetor Co. in 1916. He opened and managed Stromberg branches in Kansas City, New York, and London, England. During the war he was assistant to the general manager and sales manager of the Zenith Carburetor Division.

R. C. Allan



MYRON S. HUCKLE, a lieutenant colonel in the Army Air Corps Reserve, has joined M & H Industries, Seattle, Wash.

Formerly sales engineer with New Departure Division, General Motors Corp., Detroit, **F. S. BEASECKER** has been elected president of Carolina Bearings Co., Greenville, S. C., a distributing organization.

A fund to establish the O. A. Leutwiler Award, to be given annually to the two outstanding seniors in mechanical engineering, is being raised to honor **O. A. LEUTWILER,** now retired after 42 years on the mechanical engineering faculty of the University of Illinois.

JERE T. FARRAH, manager of American Airlines Industrial engineering branch, has been appointed the company aircraft procurement representative at Boeing Aircraft, Seattle. He will work on the airline's contract for eight Boeing "Stratocruisers" scheduled for delivery during 1947. Upon graduation from the University of Michigan in 1938, he worked for Norris & Elliott Co., Inc., and joined American in 1942 as chief flight analyst. Later he was project engineer on the Douglas DC-6 in developing specifications.

After a tour of duty with the U. S. Navy as a commander, **JOSEPH C. ANDERSON** is now a sales engineer for Boeing Aircraft Co., Seattle, Wash. He had been with the Navy Bureau of Aeronautics, Washington, D. C.

Resigning from Creole Petroleum Corp., New York, where he had been technical assistant to the head of manufacturing, **MILTON H. CLAPP** has joined Standard Oil Co. (N. J.), same city.

Until released from the U. S. Navy as an instructor in the Officers School, Jacksonville, Fla., **GEORGE EUGENE ADAMS** has joined the Lincoln Division of Ford Motor Co., Dearborn, as a designer in the chassis department.

FRANK M. AULD has been appointed service organizer of the Mercury-Lincoln Division of Ford Motor Co. (Canada) Ltd., at Winnipeg. He served the Canadian Army as adjutant in the Royal Canadian Electrical and Mechanical Engineers overseas.

Undertaking research in nuclear physics, **KNIGHT S. CARSON** has joined the staff of the radiation laboratory of the University of California, Berkeley.

CHESTER E. BECK has been appointed air conditioning and heating engineer of GMC Truck & Coach Division, General Motors Corp., Pontiac, Mich., having been transferred from the Kansas City branch as coach service engineer.

Koehn Motors, Inc., Danville, Ill., has promoted **ALBERT L. FARNSWORTH** to the

t SAE Members

position of service manager. He had been service foreman of the company, and earlier had been fleet maintenance supervisor, Air Reduction Sales Co., New York City.

VINCENT JOSEPH ZARDUS is now transmission design engineer with Kellett Aircraft Corp., North Wales, Pa. He had been one of the company's layout draftsmen.

MAJOR WALTER H. NILES, formerly USAAF, now a partner in the industrial design firm of Bruce Kamp Associates, New York and Philadelphia, was awarded the Legion of Merit in presentation ceremonies at Mitchel Field, New York, for his work in developing automatic controls for the eventual "push-button" airplane. In his new civilian status, Major Niles is helping to restyle equipment and products for merchandising appeal.

LT.-COM. P. N. SHAMER, USN, who recently completed a post-graduate course at Massachusetts Institute of Technology, has been assigned to the U.S.S. Iowa.

Since last January, **GORDON L. WOOD** has been branch sales manager for the War Assets Corp., Ottawa, Canada. He had been with the Royal Bank of Canada, and later with the Wartime Prices & Trade Board of Canada.

The Chicago branch of Ensign Carburetor Co. has been moved to 2330 West 58 Street, Chicago 36, near the Chicago Municipal Airport, according to an announcement made by **C. F. KEENE,** for more than 30 years branch manager. He and **A. J. ST. GEORGE,** assistant manager, have been in charge of laying out the new facilities in the modern factory building recently acquired by the company.

LT.-COL. C. C. LAWTON, U. S. Army Quartermaster Corps, has returned to the European Theatre of Operations from Camp Lee, Va., where he had been a director of supply.

The new assistant general manager of Universal Friction Materials Co., Kendallville, Ind., is **HARVEY J. LIDKEA,** who had been living in Hillsdale, Mich.

LESTER A. LANNING has been transferred to the Sandusky, Ohio, plant of New Departure Division, General Motors Corp., from the Bristol, Conn., works of the company. He has been appointed plant manager.

Until recently a senior designer at Chevrolet Motor Division, General Motors Corp., **WALTER WYSS** has joined Beech Aircraft Corp., Wichita, as staff engineer.

Upon his retirement from the U. S. Army Air Forces as a captain, **CHARLES P. TURNER** joined General Chemical Co., North Claymont, Del., as a mechanical foreman.

After spending two years sailing his auxiliary yacht from Chicago, down the Mississippi, through the Gulf of Mexico and to ports in the Caribbean, **BJARNE THULIN** has returned to the Continental Can Co., Chicago, as design engineer in the Equipment Development Division. He sold his yacht, the "Mary Lou," to the Florida Naval Academy, St. Augustine, for a training ship.

Now an assistant engineer with Wickes Boiler Co., Saginaw, Mich., **THOMAS CHLEBINA** had been a student at Michigan State College, East Lansing.

Now an instructor at the Academy of Aeronautics, LaGuardia Field, New York, **HARRY S. EGERTON** had been a design engineer with the Helicopter Research Division, Donnell Aircraft Corp., St. Louis.

LOUIS A. EDELMAN has been assigned to Marshall Field, Fort Riley, Kansas, as maintenance officer.

Until recently an electrical engineer with the National Advisory Committee for Aeronautics, Cleveland, **DOUGLAS P. WALSTROM** is a design engineer with Northrop-Hendy Co., Hawthorne, Calif.

CLAYTON O. DOHRENWEND has resigned as director of the department of mechanics, Illinois Institute of Technology, Chicago, to join Midwest Research Institute, Kansas City, Mo.

Now president and general manager of R. S. Evans Garages, Inc., Miami, Fla., **W. E. ENGLAND** had been inspection supervisor for Jack & Heintz, Precision Products, Bedford, Ohio.

R. C. LOOMIS has been appointed manager of engineering and overhaul, Transcontinental & Western Air, Inc., Kansas City, Mo. He had been the air line's director of engineering and now has supervision of that office, as well as being director of overhaul and all activities of the company's overhaul base at Fairfax Municipal Airport. He has been a staunch supporter of the SAE aeronautical standards program.

R. C. Loomis

S. G. Nordlinger

Chief engineer of the ATC China-Burma-India Theater for a year and a half, and prior to that chief of the AAF Power Plant Unit at Wright Field, **LT.-COL. S. G. NORDLINGER** has been appointed head of Unconventional Power Plant Engineering, Ranger Aircraft Engines Division, Fairchild Engine & Aircraft Corp., Farmingdale, Long Island, N. Y. He left the Aircraft Engine Division of Continental Motors Corp. to enter military service in August, 1941. He had previously been head of the Aviation Section of Shell Oil Co., Inc., in 1937, having spent three years before that in the Army.

WILBUR F. FUSSELMAN has organized the Radar Products Co., Bloomfield, N. J., manufacturers of radar chokes and flanges. He had been senior partner and sales engineer of Wilmar Products, Maplewood, N. J.

To forget about Army life and particularly automotive maintenance headaches he suffered overseas, **H. L. FREEMAN** has gone fishing. He expects to resume his interest in SAE meetings and the *SAE Journal* "when the fish have had enough fun" at his expense. He lives in Inglewood, Calif.

WILLIAM A. FURST has been appointed chief engineer of O. E. Szekely & Associates, Philadelphia, having recently resigned as chief engineer of Stratos Corp., Babylon, Long Island, N. Y.

Prior to his employment as chief engineer, Aircraft Screw Products Co., Long Island City, N. Y., **JOHN O. FORSTER** held the same position at Bulova Watch Co., Fuel Injection Division, Valley Stream, L. I., N. Y.

W. H. BALL has been appointed lubrication engineer for The Texas Co., in the San Francisco office.

Formerly a radio technician with the U. S. Army Air Forces at Kessler Field, Miss., **H. WARREN LUFKIN** is an electronic technician with D. W. Onan & Sons, Minneapolis. He is at the University Avenue plant of the company, which manufactures portable power and light plants.

Norton Co. of Canada, Ltd., Hamilton, Ont., is now known as Norton Co., Worcester, Mass., and **PHILIP M. COOKE,** formerly managing director of the Canadian organization, has been appointed manager of the company's foreign division, with offices in Worcester.

Resigning from Pratt & Whitney Aircraft, United Aircraft Corp., East Hartford, Conn., **CARL F. BLAKELY** is now an aviation engineer with Socony-Vacuum Oil Co., Inc., New York City.

Since his return from military service with the RAF in Washington, D. C., to the Toronto Hydro-Electric System, **DOUGLAS G. MOFFITT** has been made a member of the Military Division of the Order of the British Empire by King George VI. As liaison officer between the British Air Commission and the SAE, Mr. Moffit was largely responsible for coordination of aeronautical standards work between the two countries. His military rank was acting squadron leader.

Until recently a metallurgist with Thompson Aircraft Products Co., Euclid, Ohio, **JOHN WISCHHUSEN** has joined Cleveland Hard Facing, Inc.

SEELEY E. BUCK is an experimental engineer with American LaFrance Foamite Co., Elmira. He had been project coordinator in the engineering department of Aeronca Aircraft Corp., Middletown, Ohio.

On leave of absence from New York University for the academic year of 1946-47, **GORDON H. STROM** plans to complete his work toward a doctor's degree at the University of Minnesota. He is an assistant professor of aeronautical engineering.

JACKSON G. KUHN, formerly chief engineer of Gladden Products Corp., Glendale, Calif., is now an engineer with Los Angeles Scientific Instrument Co.

Permanente Metals Corp. (Kaiser Aluminum), Detroit, has appointed **LEE C. JENNE** its metallurgical engineer in charge of the automotive business. He had been technical adviser with Reynolds Metals Co., the same city.

JAMES R. SAUSSER, JR., who was a lieutenant (j.g.) assigned to the Material Redistribution Office of the Navy, has rejoined Caterpillar Tractor Co., Peoria, Ill., as a research engineer.

EDWARD S. COBB has joined Heyer Products Co., Belleville, N. J. He had been with Wright Aeronautical Corp. as a senior test engineer.

J. E. Reagan

J. E. REAGAN, formerly director of sales and service for Elco Lubricant Corp., Cleveland, has been elected vice-president and a member of the board of the company. Prior to joining Elco he had been for many years general service manager of Timken Roller Bearing Co.

Now a partner in the firm of Variety Development & Engineering Co., Los Angeles, **C. B. LIVERS** has resigned as chief engineer of Aireon Mfg. Corp., Burbank, Calif.

Until recently a lieutenant colonel in the AAF in charge of the engineering branch of the Air Transport Command, **G. W. GILMER III** is supervisor of maintenance planning for American Airlines, Inc., La-Guardia Field, New York City.

Thomas L. Jackson

Culver Aircraft Corp., Wichita, has appointed **THOMAS L. JACKSON** to the position of chief production engineer.

DOUGLAS E. AGREN has been relieved of active service with the U. S. Navy as a lieutenant and is now product engineer with Industrial Wire Cloth Products Corp., Wayne, Mich.

Until recently an aviation cadet, AAF, **JAMES E. WASEM, JR.,** is a mechanical engineer with General Electric Co., Schenectady, N. Y.

ANDREW I. JOHNSON, recently discharged from the AAF, has been appointed an engineer in the construction and maintenance department, E. I. du Pont de Nemours & Co., Graselli Chemicals Department, East Chicago, Ind.

"Opportunities in the Trucking Business" was the subject of an interview recently conducted over Station WNEW between **M. C. HORINE,** sales promotion manager of Mack-International Motor Truck Corp., and Michael Gore, author of "101 Ways to be Your Own Boss." The broadcast was one of a series presented by Mr. Gore under the title "Be Your Own Boss" with special emphasis on the veteran who is desirous of setting himself up in business.

M. C. Horine

LOUIS G. BURNS has been named chief research engineer of Pesco Products Co. Division, Borg-Warner Corp., Cleveland. He had been chief of the Fuel System Division, Air Technical Service Command, AAF, at Wright Field, Dayton, Ohio.

John A. McLaine

A recent speaker at the clinic of the Unit Parts Syracuse Corp., **JOHN A. McLAINE,** American Brakeblok Division, American Brake Shoe Co., described the development of the modern braking system. The clinic was planned as a refresher course for returned veterans.

Formerly assistant works manager and chief engineer of the Propeller Division, Canadian Car & Foundry Co., Ltd., Montreal, **CHARLES LATHREM** has been appointed chief propeller engineer of Aircooled Motors, Inc., Syracuse, N. Y.

Upon resigning as president, Pacific Engineering Corp., Los Angeles, **RALPH H. SWAISGOOD** has been elected president of Pentar Corp., Glendale, a firm devoted to the development of products.

LT.-COM. H. G. STEIGERWALT, USNR, Bureau of Aeronautics, has been assigned to Philadelphia. He had been the Navy resident representative at Crown Can Co., same city.

Until recently technical data liaison officer, British Air Commission, **W. M. BROWN** has been appointed instructor of mechanical engineering drafting, Columbia Technical Institute, Washington, D. C.

RICHARD L. NELSON, until recently service engineer for Faber Laboratories, Inc., Chicago, has joined the staff of Machesney Airport, Rockford, Ill.

American Locomotive Co. has transferred **R. TOM SAWYER** from the Schenectady plant to New York City. He is an engineer in the diesel equipment department of the company.

EDWARD P. ODDY, who had been a sales-service engineer for J. N. Fauver Co., Inc., Detroit, has been a research engineer with Ethyl Corp., Detroit, for more than a year.

Soon after he left the Navy as a project engineer in the aeronautical engine laboratory, Philadelphia Navy Yard, **THOMAS E. MURPHY** joined the faculty of the University of Minnesota as assistant professor of mechanical engineering.

C. O. FRENCH, JR., who was recently discharged from active service as lieutenant colonel assigned to headquarters, Air Technical Service Command, Wright Field, is a development engineer with Intava, Inc., New York City.

H. W. Francis

H. W. FRANCIS, as the new chief engineer of the Air Service Branch, Saskatchewan Department of Natural Resources, plans to have a hand in opening up and expanding the vast northern territories of Canada. He had been a training administrator of the U. S. Army Air Transport Command at Saskatoon, Sask., Canada.

Cleveland Graphite Bronze Co. has increased its manufacturing facilities with the purchase of a new factory with 42,500 feet of space at Fort Wayne, Ind., President BEN F. HOPKINS announced. The property, on a railroad siding, has nearly three acres of land. The Cleveland and Bridgeport, Ohio, plants of the company will continue at their full capacities. Strip mill equipment will be installed in the Port Wayne plant to process continuous coated steel strip from which bearings are made. The move, Mr. Hopkins said, will permit the company to serve the midwestern industries.

MISS MARY SHERRY, president of Sherry Enterprises, Hollywood, Calif., is organizing a motion picture company to produce a semidocumentary film on gliders. She had been an inspector at Lockheed Aircraft Corp., Burbank.

SAE MEMBERS who have assumed new positions are: GLENN L. MORRIS, plant and equipment design engineer, Carnation Co., Oconomowoc, Wis.; GERALD G. HEPBURN, junior engineer, Republic Aviation Corp., Farmingdale, L. I., N. Y.; DONALD E. CRESSEY, drafting engineer, McDonnell Aircraft Corp., St. Louis, Mo.; WESLEY A. HARPER, agricultural engineer, Rome Plow Co., Cedartown, Ga.; STANLEY T. URBANIAK, diesel testing engineer, John Deere Tractor Co., Waterloo, Iowa; WEBSTER J. OWEN, test engineer, Cadillac Motor Car Division, General Motors Corp., Detroit.

WEBB MILLER, aerodynamicist, Douglas Aircraft Co., Inc., Santa Monica, Calif.; JOSEPH J. BROWN, superintendent, Hoffco Pump Co., Long Beach, Calif.; F. R. McLEOD, assistant chief engineer in charge of construction and maintenance activities of canning, quick freezing and plant facilities, Deerfield Packing Corp., Bridgeton, N. J.; JOHN W. HOSPERS, analytical engineer, Lycoming Division, Aviation Corp., Williamsport, Pa.; CHARLES L. PAXTON, assistant to general sales manager, Jack & Heintz, Precision Products, Inc., Cleveland, Ohio.

HORACE D. TAYLOR has been appointed junior assistant to the superintendent of equipment, Brookline Highway Department, City of Brookline, Mass. He had served as a technician in the laboratory of Moore General Hospital, Swannanoa, N. C.

G. L. Reynolds

Active in automotive engineering for more than 25 years, G. L. REYNOLDS has been appointed chief engineer of Novo Engine Co., Lansing, Mich. He had been head of the Service Division of Fram Corp., having been service engineer with Paige Detroit Motor Car Co., later Graham-Paige Corp., and had been experimental engineer of that company.

DONALD B. ROBERTS, who saw service overseas as a captain in the AAF, has been appointed sales engineer of the Delco Battery Operations, Delco-Remy Division, General Motors Corp., with headquarters at Muncie, Ind. He had formerly been chief engineer of the Muncie Plant No. 2.

Now senior mechanical engineer with Fredric Flader, Inc., ALBERT L. PRESTON has been assigned to the Oak Ridge, Tenn., establishment of the company which is doing experimental and development work on gas turbines, jets, and other high performance powerplants.

Bruce M. Scriver

Following the expansion of Briggs Clarifier Division, Consolidated Engines & Machinery Co., Ltd., Montreal, BRUCE M. SCRIVER has been named chief engineer.

Now a consulting engineer for National Bronze & Aluminum Foundry Co., Cleveland Ohio, SERGEI G. GUINS had been an analytical engineer with Curtiss-Wright Corp.

C. WILLIAM BOLLER is engineering manager of Pine-Ihrig Machine Co., Oshkosh, Wis., having resigned as a designer with Pratt & Whitney Aircraft, Division United Aircraft Corp., East Hartford, Conn.

Resigning recently from Wesco Electric Co., where he had been chief mechanical designer in charge of processing, HOWARD R. KLAUER has opened a consulting engineering service at 639 North Central Park Avenue, Chicago.

MILFORD D. STEWART has been appointed chief engineer of Oliver Corp., South Bend, Ind. He had been assistant chief engineer of the company.

The viewpoints of an engineer and an architect are synthesized on the subject of fundamental airport planning and design in a new book entitled "Airport Planning" by CHARLES FROESCH, chief engineer, and Walther Prokosch, architect, both of Eastern Air Lines, Inc. Specific suggestions, including diagrams and photographs, are made concerning types of airports, the classification being made according to flying activity and individual community needs. The volume also covers traffic control, lighting, and hangar design. It is published by John Wiley & Sons, Inc., New York, 1946.

HARRY F. GRAY is now associated with Thompson Products, Inc., Cleveland, in the manufacture of cast iron piston rings for export. He continues as president of the International Piston Ring Co. which now operates as a distributing organization. Mr. Gray is a past chairman of the SAE Cleveland Section.

Released from the AAF as a colonel, JOHN D. TEBBEN has been appointed assistant to the president of H. A. Wilson Co., Newark, N. J. He was in the Army for three and a half years.

WEI-SHENG WU, who served as a lieutenant liaison officer, has joined Pratt & Whitney Aircraft Division, United Aircraft Corp., as Chinese Air Force engineer at East Hartford, Conn.

Returning to the Ethyl Corp., Ferndale, Mich., LT. (jg) JOSEPH A. CIPOLLA had seen service on the U.S.S. Eaton in the Pacific campaigns.

Christy C. Butterworth

CHRISTY C. BUTTERWORTH, who recently assumed the post of vice-chairman of the SAE St. Louis Section, and who has been serving as the SAE Journal field editor there, has been appointed managing director of Chek-Chart Corp., Chicago. He had been associated with Business Collaborators, Inc., St. Louis, as managing editor.

Returning to Chek-Chart Corp., Chicago, WILLIAM H. RUSKAMP, JR., had served as a captain in headquarters of the Chief of Engineers, Washington, D. C.

C. L. Fike

C. L. FIKE, formerly a colonel in the United States Marine Corps, has joined Edward G. Budd Mfg. Co. as assistant to **DONALD ALEXANDER,** vice-president in charge of sales. Mr. Fike has just retired from the Marines where he served as deputy director, Pilotless Aircraft Division, Bureau of Aircraft in Washington, D. C. Mr. Fike holds the following military citations: Distinguished Service Medal, Distinguished Flying Cross, Bronze Star, and Presidential Unit Citation.

RAY H. BRUNDIGE has been elected vice-president and general manager of Columbia Terminals Co., Inc., Indianapolis. Late last year he retired from active duty with the Army as a lieutenant colonel in the Headquarters, Armored Service, Fort Knox, Ky.

After four and one-half years in the Navy, **COM. K. A. AYERS** has retired from the service and announced plans to go into business for himself. He had been lubrication engineer for Standard Oil Co. (Calif.). An officer of the carrier U.S.S. Shangri-La, he served aboard that noted vessel throughout the South Pacific campaign and during the final air campaign on Japan.

In a memorial booklet dedicated to the memory of the late Col. **E. J. W. RAGSDALE,** soldier, educator, engineer and pioneer in development of stainless steel welding techniques, **EDWARD G. BUDD,** president of Budd Mfg. Co., Philadelphia, paid warm tribute to his associate. The booklet also contains the technical paper "Design Considerations for Railway Passenger Cars," presented Feb. 13 before the SAE Dayton Section, and an address prepared for a group of technical editors on "People Are Going To Go Places."

JAMES J. WELKER has been named assistant resident manager of Fisher Body Division, General Motors Corp., Pontiac, Mich. He had been with the Fleetwood unit of the same division in Detroit.

Clarence G. Wood

CLARENCE G. WOOD, former head of his own machine tool and manufacturing equipment distributing concern, has been appointed manager of sales promotion for the American Coach & Body Co., Cleveland. A veteran of World War I, Mr. Wood served the U. S. Army again during the past emergency when he became successively commanding officer of the Lima Locomotive Tank Arsenal and the Lima Tank Depot, and later inspector of the Cleveland Ordnance District.

ROBERT C. HENN has returned to Monroe Calculating Machine Co., Orange, N. J., following a period of service with the Air Technical Service Command, AAF, stationed at Red Bank, N. J. He is a product design engineer.

NEWELL H. McCUEN has joined Cadillac Motor Car Division, General Motors Corp., as inspection supervisor. He was released from the Navy recently.

CAPT. GEORGE GOODRICH LAMB, who served the U. S. Navy in the Bureau of Aeronautics, Washington, D. C., has been released from active duty and has returned to the Northwestern Technological Institute, Evanston, Ill.

Until his release from service, **LELAND B. MIXON** had served the U. S. Army as a warrant officer in the Infantry. He is half owner and operator of the McKnight Service Station, San Bernardino, Calif.

MAJOR A. E. CLEVELAND, who served as an Ordnance Department officer in Detroit, is chief of the Automotive Products Division, Perfection Stove Co., Cleveland, Ohio.

Pan American Grace Airlines has appointed **F. A. KIMMONS** director of maintenance training. He had been field service coordinator, Curtiss Propeller Division, Curtiss-Wright Corp., Caldwell, N. J. He has been assigned to Lima, Peru.

WILLIAM G. ZINK has been assigned to the Los Angeles office of the B. F. Goodrich Co. as assistant manager of automotive, aeronautical, and Government sales. He had been with the Dallas, Texas, Division of the company for the past four years.

Until recently service manager of Jack & Heintz Precision Products, Inc., Cleveland, **FRANK J. KUNNA** has organized Kunna Builders, Mesa, Ariz., of which he is owner and president.

Father and Son Are SAE Members . . .

J. Edward Schipper, Jr.

J. Edward Schipper

CAPT. J. EDWARD SCHIPPER, JR., has just returned to the National Carbon Co., after a three and one-half year military leave, when he served more than two years in the Pacific Theater as commander of the 3553 Ordnance Automotive Maintenance Company. This unit had an outstanding record and received several commendations and the Meritorious Service Award. Mr. Schipper entered the service from the Pittsburgh Section but has now been transferred to the New York area to work in the automotive engineering department on new synthetic lubricants. Prior to his association with the National Carbon Co. in Pittsburgh, Mr. Schipper was on the editorial staff of *MoToR* magazine and was active in the Metropolitan Section activities where he served on the Governing Board for several years.

J. EDWARD SCHIPPER, whose appointment as manager of the Detroit office, Arthur Kudner, Inc., was announced last month in the *SAE Journal,* has been a member of the Society for 33 years.

DONALD **E. PLATZ,** who saw three years' service with the AAF, including work as an aerial engineer in Burma and China, has joined Columbia Aircraft Corp., Valley Stream, N. Y., as a test engineer.

CAPT. **GERALD R. ALMY,** who served with the AAF, has joined Studebaker Corp., South Bend, Ind., in the sales promotion and advertising departments.

KEITH E. COXE, recently discharged from the U. S. Army where he served for some time at Aberdeen Proving Ground, Md., has joined the firm of Julian Staven, consulting engineers, Rapid City, S. D.

NICHOLAS A. NOREYKO has joined Wilcox-Rich Division, Eaton Mfg. Co., Detroit, as chief draftsman. Until recently he had been in the Navy.

Released from the Army as a lieutenant in overseas service, **THOMAS JAY REEVES** has returned to Continental Motors Corp., Muskegon, Mich., as a development engineer.

Until recently a first lieutenant in the Army Ordnance Department, **CONRAD R. VEGREN** has joined the U. S. Navy Bureau of Ordnance as a mechanical engineer.

MAJOR **WILLIAM T. TIERNEY** has been released from the U. S. Army Corps of Engineers and has returned to The Texas Co., Beacon, N. Y., as a research mechanical engineer.

EDWARD DE WOOD COREY has been appointed assistant engineer of Western Wax Paper Co., Los Angeles, having served in the U. S. Coast Guard as a machinist's mate, first class.

WALTER S. FORTNEY, who has been serving in the AAF as an engineering officer, has returned to United Motors Service Division, General Motors Corp., as district manager at Dallas, Texas.

RICHARD H. PREWITT, one of the nation's pioneer developers of the rotary type of aircraft, and formerly vice-president and chief engineer of Kellett Aircraft Corp., has resigned his position to become a consulting engineer. His office is at Avondale and Turner Road, Wallingford, Pa. At the unanimous urging of members of the SAE Committee S-2, Helicopters, he has agreed to remain chairman of that group which is working on development of technical data on helicopters, and the dissemination of this information to engineers interested in helicopters.

Formerly design engineer with Douglas Aircraft Co., **WILLIAM R. HUMES** has joined North American Aircraft Co., Inglewood, Calif., in the same capacity.

CARL A. HAZLEWOOD, until last December chief engineer of Higgins Engine Co., Inc., has joined Paragon Tool & Mfg. Co., New Orleans, La.

Prior to his enlistment in the U. S. Navy, **JOHN B. BIERBOWER** was employed by Solar Aircraft Co., San Diego, Calif., and upon discharge returned to that company as research staff engineer.

Formerly district manager, Penola, Inc., Detroit, **CHESTER L. WENTZ** is now assistant manager of the same company, Chicago.

An enrolled student while at Purdue University, **CURTIS C. HILL** has now taken a position as inspector, Associated Factory Mutual Fire Insurance Cos., Boston, Mass.

THEODORE F. PETERS has currently severed his association with Graham-Paige Motors Corp., Willow Run, Mich., to join the Gar Wood Industries, Inc., Wayne, Mich., as project engineer.

Now a consulting engineer, Dearborn, Mich., **HOWARD W. SIMPSON** was formerly associated with Spicer Mfg. Corp., Toledo, Ohio.

MEDARD J. SPENCER is now affiliated with the Glenn L. Martin Co., Baltimore, Md. He had been employed as a power plant engineer, Allison Division, General Motors Corp., Indianapolis.

Previously a materials and process engineer, Commonwealth Aircraft, Inc., New York, N. Y., **SIDNEY R. WOLF** is now employed as a project engineer, Brentwing Engineering Co., Kansas City, Mo.

JOSEPH DEKTOR has been promoted to the position of engine tester, Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn.

GLENN EDWARD HERZ, who has taken a position as layout draftsman, Hyster Co., Portland, Ore., was a lieutenant (jg) in the U. S. Navy, Naval Supply Depot, Mechanicsburg, Pa.

Formerly field and service mechanic, Douglas Aircraft Co., Inc., Experimental Flight Test Division, Minesfield, Calif., **EUGENE MICHALCZYK** is now senior mechanic, American Airlines, Inc., Anderson Field, El Paso, Texas.

ROBERT W. LINDBERG, who had been an engineering consultant, Engineering Project Service, Los Angeles, is now chief process engineer in charge of assembly of process specifications, Aviation Maintenance Corp., Van Nuys, Calif.

A lieutenant-commander in the U. S. Navy, **CHARLES H. MARTENS** is now mechanical engineer on aircraft power plants, Air Material Command, Wright Field, Dayton, Ohio.

CARROLL R. ALDEN will address the Toronto chapter of the American Society of Tool Engineers, September 9, on the subject, "Modern Developments in Precision Boring." Mr. Alden is research engineer for Ex-Cell-O Corp., and has been an active member of the SAE for many years, having served as Vice-chairman of the Detroit Section in 1943.

Formerly engineer on design and production of pre-fabricated homes for U. S. Homes, Inc., Marietta, Ga., **PARKER M. BARTLETT** is now employed at the Power Plants Division, Bureau of Aeronautics, Navy Department, Washington 25, D. C.

WILLIAM FREIDEN, previously chief engineer, Eagle Mfg. Co., Division, Four Wheel Drive Auto Co., Appleton, Wis., is now proprietor of Central States Engineering and Sales Co., Omaha, Nebr.

Formerly an ensign, U. S. Navy, Training School, Cornell University, Ithaca, N. Y., **JESSE L. SHEARER** is now employed as a tool engineer, Climax Engineering Co Clinton, Iowa.

Previously a lieutenant-commander in the U. S. Navy, **MARSHALL J. WATERS** has now become associated with Shell Oil Co., Inc., Products Application & Development Department, San Francisco.

Prior to his employment as automotive engineer, Aberdeen Proving Ground, Aberdeen, Md., **ROY KAMO** was an enrolled student at the University of Michigan, Ann Arbor, Mich.

WILLIAM I. TRUETTNER, who for the past 18 months has been a member of the faculty of the University of Puerto Rico as an exchange professor, is returning to the mechanical engineering department of the Agricultural and Mechanical College of Texas, College Station, Tex.

RODMAN J. OSPLACK has been promoted from the position of gear engineer to the staff of the vice-president, Vinco Corp., Detroit.

Formerly experimental engine draftsman, Dymaxion Dwelling Machines, Inc., Wichita, Kan., **WILLIAM W. THOMSON** is now experimental development engineer, Wilson Zuck Aircraft Co., Tulsa, Okla.

EARL E. R. JONES, previously an ensign, U. S. Navy, will be a graduate student, University of California, Berkeley, starting with the fall semester.

After an absence of more than five years in Canadian military service, in which he reached the rank of lieutenant colonel, **W. GORDON DEWAR** has returned to the Bell Telephone Co. of Canada, Montreal. His last assignment with the Canadian Army was that of assistant quartermaster general (transport). He was responsible for

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the design, operation, and maintenance of all vehicles and ships of the Quartermaster General's Branch of Canada.

MALCOLM C. MORRISON has returned from temporary duty as Ordnance Technical Industrial Investigator in Japan to his former position at the Detroit Arsenal, formerly the Office of the Chief of Ordnance-Detroit.

Recently resigned from his position as assistant to the president, Four Wheel Drive Auto Co., Clintonville, Wis., **F. H. VIVIAN** has joined the Honolulu Iron Works Co., consulting and contracting engineers, Hawaii.

Formerly field service supervisor of Packard Motor Car Co., **JOHN P. MILLET** has been appointed field service manager, Twin Coach Co., Kent, Ohio.

Until recently chief engineer of Kropp Forge Co., Chicago, **DALE L. BENNETT** has joined Kiekhaefer Corp., Cedarburg, Wis.

CLAUDE ELLSWORTH WHITE who served overseas as a technical observer for General Motors Corp. during the war, has been appointed managing director of Far East Motors, Hongkong, China.

HERMAN PALTER, formerly with the Aircraft Engine Research Laboratory, NACA, Cleveland, as mechanical engineer, has joined the Cleveland Hobbing Machine Co., Cleveland, as a designer.

JAMES H. THOMSON, until recently manager of engineering sales, Pedlar People, Ltd., Oshawa, Canada, has been appointed sales manager of Thomas Irwin & Son, Ltd., Hamilton, Canada.

J. F. BUGBEE, who recently retired from the Army Corps of Engineers as a lieutenant colonel, has joined the technical and research division of The Texas Co., New York, as automotive engineer.

J. W. HARLEY, JR., has been appointed chief engineer of Wright & Thompson, Petoskey, Mich., a designing and engineering service. He had been associated with Bendix Aviation Corp., Owosso, Mich. as chief engineer.

Since his discharge from the U. S. Army Signal Corps, Fort Monmouth, N. J., **HARRY L. NORTON** has been serving as a marketing analyst, War Assets Administration, New York.

F. R. GAYLORD has been promoted to the position of general manager of Columbia Terminals Co., Inc., Cincinnati. He had been assistant general manager of the concern.

W. H. (Bill) WHITE, who has been director of sales for Atlas Steels, Ltd., Welland, Ontario, has joined the Allegheny Ludlum Steel Corp. in the Ferndale-Detroit office.

Resigning from the Armour Research Foundation, Chicago, as assistant engineer, **CHARLES E. WOLMER** has joined the American Cyanamid Co., Stamford, Conn.

JOHN W. F. READ has joined the Antwerp, Belgium, office of General Motors Continental, S. A. He had been on an assignment of General Motors Overseas Operations.

Now chief engineer of Liggett Spring & Axle Co., Monongahela, Pa., **WARREN W. JONES, SR.,** recently resigned as chief de-

sign engineer of the American Bantam Car Co., Butler, Pa.

Formerly assistant to director of development, Thompson Products, Inc., Cleveland, **FRANK B. ROBB** is now owner and operator of a trailer camp in Glendora, Calif.

WILLIAM H. RADFORD, previously associate director of research, Caterpillar Tractor Co., Peoria, Ill., has retired.

JOHN ARENDT, JR., an enrolled student at Chrysler Inst., is now working as a mechanical designing engineer, The Austin Co., Cleveland, Ohio.

Until recently staff assistant to production manager, Glenn L. Martin Co., Baltimore, Md., **EARL J. SWAILES** has joined Goodwill Industries of Chicago.

RICHARD A. HAMEISTER is currently affiliated with Holley Carburetor Co., Detroit. He had served as an ensign in the U. S. Navy, overseas.

After his discharge from the Navy, **WILLIAM B. CRUMP** took a position with Cadillac Motor Car Co. and is currently employed by the Clark Equipment Co., Buchanan, Mich.

EARLE W. PUGHE has been made plant manager of Chevrolet's Commercial Body Division in Indianapolis, it was announced by **HUGH DEAN**, general manufacturing manager for the Chevrolet Motor Division of General Motors. Mr. Pughe joined Chev-

OBITUARIES

Arthur J. Schamehorn

A. J. Schamehorn, assistant administrative engineer of the General Motors Technical Center in Detroit, died suddenly at his desk in the General Motors Building. He was 58 years old.

Upon graduation from the University of Michigan in 1911, Mr. Schamehorn took a position with the Government as an engineer inspector until joining the Michigan Central Railroad. In 1915, he became associated with the Hyatt Roller Bearing Co., Harrison, N. J., and later transferred to the General Motors Truck Co., Pontiac. After a number of assignments with General Motors Corp., among them the management of the General Motors Exhibit at Atlantic City, directorship of the GM Proving Ground at Milford, Mich., and management of the Linden Division of General Motors at Linden, N. J., Mr. Schamehorn entered the Ordnance Department, Washington, D. C., with the rank of colonel. He was discharged in June, 1945, and rejoined General Motors a month later.

A member of the Society for 16 years, Mr. Schamehorn was active on many SAE technical committees. For five years he was SAE representative on the Advisory Committee of the Highway Research Board and served for several years on the ASA Sectional Committee (D7) which worked on Safety Code for Developing Standards for the Inspection of Motor Vehicles. He also participated in the work of the SAE Brake Committee, the SAE Riding Comfort Research Committee and the SAE Highways Research Committee.

Fred L. Eberhardt

For 45 years president of Gould & Eberhardt, Inc., Irvington, N. J., Fred L. Eberhardt died July 18 after an illness of six months. He was 78 years old.

A past-president of the National Machine Tool Builders' Association, active in the ASME for over 55 years, Mr. Eberhardt was elected a member of the SAE more than 27 years ago. One of the earliest graduates of Newark Technical School, he served as president of the board of trustees of that institution and the Newark College of Engineering. He was active in civic betterment of his own community of Maplewood, N. J.

Winfred H. Roberts

Winfred H. Roberts, a member of the Society since 1913, died recently. A graduate of New York University, Mr. Roberts worked as a construction engineer on many civic projects, among them the Harlem River Driveway, Titicus Dam, and Empire City Race Track. He later took a position as civil and mechanical engineer with the Department of Finance, New York.

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rolet as mechanical engineer in 1925 and has served the company in Cleveland, St. Louis, Kansas City and Buffalo.

A district manager with Packard Motor Car Co., Detroit, **ROBERT M. THOMPSON** has now taken a supervisory position at the Lincoln Mercury Division, Ford Motor Co., Des Moines, Iowa.

Chief Engineer **WILLIAM H. SNOW,** has taken a position with Pacific Coast Engineering Co., Manhattan Beach, Calif. He had previously been affiliated with Nutt-Shel Co., Los Angeles.

ARTHUR N. LILLENAS, formerly senior test engineer, Wright Aeronautical Corp., Paterson, N. J., is presently working as a mechanical engineer with the Pillsbury Mills, Inc., Minneapolis, Minn.

Previously employed by Detroit Diesel Engine Division, GMC, Detroit, **NEIL W. McLEOD** is currently serving as sales engineer and service manager for Evans Engine and Equipment Co., Seattle.

RALPH P. HORAN has left Carbide & Carbon Chemicals Corp., Oak Ridge, Tenn., to join Hudson Motor Car Co., Detroit, as test and development engineer on engines.

Until recently a student at Yale University, **BENJAMIN B. duPONT** has joined Wheeler Consultancy, Springfield, Mass., as an industrial designer.

CHARLES W. IRWIN has been appointed manager of Special Products Department, Shell Oil Co., Inc., Detroit. He had been industrial engineer with the same company.

Now chief draftsman with Salsbury Motors, Inc., Pomona, Calif., **LEONARD E. MILES** had been a project engineer with Booth Mfg. Corp., Burbank.

EDGAR B. OGDEN has joined Consolidated Freightways, Inc., Portland, Ore., as general service foreman. He had been assistant superintendent of maintenance, Pacific Intermountain Express Co., Salt Lake City.

Formerly partner of Elder-Richer Engineering Co., Burbank, Calif., **HARRY S. RICHER** is design engineer with Western Hydraulics, Ltd., North Hollywood. The company manufactures hydraulic controls for aircraft.

A. G. BRUCE has joined St. Clair Motors Co., Cadillac and Oldsmobile dealership, at San Jose, Calif. He had been with Ryan Cadillac Co., Seattle, Wash.

HAROLD E. FRANCIS, who was employed as an assistant chief inspector with Wright Aeronautical Corp., Cincinnati, has taken a position as assistant project engineer with the same company at their Wood-Ridge, N. J., plant.

JOHN J. JACKLITCH, JR., formerly an instructor at Case School of Applied Science and also faculty adviser for the SAE Student Branch at that school, has become affiliated with the National Advisory Committee for Aeronautics, Aircraft Engine Research Laboratory, Cleveland, as a mechanical engineer.

Discharged from the U. S. Army as a sergeant, **FRANCIS H. CATALDO** is currently employed as a body designer for the Bobbi Motor Car Corp., San Diego.

Previously a project engineer with American Airlines, Inc., LaGuardia Field, N. Y., **JOHN FISHER** has currently joined the Harrington Mfg. Co., Mansfield, Ohio, as chief engineer.

RUSSELL A. ENGSTROM, experimental engineer for Sundstrand Machine Tool Co., Pump Division, Rockford, Ill., had previously been employed as a development engineer, Direct Fuel Injection Division, Bendix Aviation Corp., South Bend, Ind.

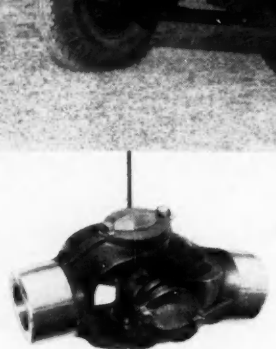
Prior to his employment as an advance engineer with General Electric Co., Bridgeport, Conn., **ROBERT R. WOODCOCK** served as an aeronautical engineering officer in the U. S. Navy.

Prior to his employment as chief engineer and production manager, American Baler Co., Bellevue, Ohio, **H. M. COOPERRIDER** served as a major with the War Department, Detroit Ordnance District, Detroit.

NORMAN FOSS is currently employed as a designer with Northrop Aircraft, Inc., Hawthorne, Calif. He had been affiliated with Emerson Electric Mfg. Co., St. Louis, Mo.

DAVID I. BABLITCH, formerly a private first class in the U. S. Army, has taken a

Below: **WARD LAFRANCE** Model D-1 — Blood Brothers Equipped



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position as assistant chief engineer, Iodent Chemical Co., Detroit, Mich.

Formerly a tune-up mechanic, Sinclair Refining Co., Chicago, **CARL W. BJELLAND** is now service manager for South Shore Motor Sales, distributors of foreign cars, in the same city.

Currently sales engineer, Honan-Crane Corp., Lebanon, Ind., **JOHN R. CUNNINGHAM** had served as an engineering officer, U. S. Navy, Annapolis, Md.

STERLING E. BABCOCK, formerly an enrolled student at Massachusetts Institute of Technology, has taken a position in the engineering department, Canadair Limited, Montreal, Que., Canada.

Previously a transmission engineer, Studebaker Corp., South Bend, Ind., **VAUGHN HAIGH** is now affiliated with Warner Gear Division, Borg Warner Corp., Muncie, Indiana, as an experimental engineer.

Formerly labor manager, British Ministry of Supply, Essex, England, **T. R. N. WHYTE** has organized his own company called Lloyd & Whyte, which will specialize in life insurance, marine engineering and agriculture.

Prior to his discharge, **CAPT. ALBERT V. ZIMMERMAN** served in the Ordnance Department, U. S. Army, Aberdeen Proving Ground, Md. Mr. Zimmerman is now district service representative, Chrysler Corp., Pittsburgh, Pa.

EMERY J. SZABO, JR., following three years' service in the U. S. Navy, has joined Leece-Neville Co., Cleveland, as a design engineer.

A battalion commander in the U. S. Army and later a lieutenant colonel during the war, **WILLIAM HYDE FISHER** has returned to the Gulf Oil Corp., Pittsburgh, as an industrial lubrication engineer. His home is in West Palm Beach, Fla.

One of the founders of Fox Oil Co., Hardin, Mont., is **RICHARD A. FOX,** who recently was relieved from active duty as a major in the U. S. Army.

WILLIAM S. KNUDSEN, former president and again a director of General Motors Corp., has been elected a director of Hupp Mfg. Co., the new name of the once-builder of motor cars. The company does not plan to reenter the vehicles business, but will continue to make automotive parts.

Members of New York's Rockefeller Center Camera Club have elected as their 1945-47 president **RAYMOND SZYMANOWITZ,** technical director, Acheson Colloids Corp., Newark, N. J. Among SAE members active in the organization are **AUSTIN P. PALMER, JOHN F. WINCHESTER,** and **VICTOR H. SCALES,** who twice served as president of the club.

First lieutenant **ROBERT J. WHITLEY,** who had been an Ordnance officer in Detroit, is staff assistant, motor vehicles, Socony-Vacuum Oil Co., Inc., New York City.

Recently discharged from the U. S. Navy as a lieutenant (jg), **RALPH H. DuBOIS** has joined Bower Roller Bearing Co., Detroit, as a member of the engineering department.

JOE MING JAY has joined the U. S. Naval Air Station, Pearl Harbor, T. H., as a mechanical engineer. He had been a stress analyst with Preco, Ltd., Los Angeles.

WILLIAM C. MORRIS, who served in the U. S. Navy as a lieutenant, has joined the Rural Electrification Administration as an associate engineer, working on powerplants. He is in the Washington office.

ALFRED HODGSON has taken a position as mechanical engineer, Trinidad Petroleum Development Co., Ltd., Trinidad, British West Indies. Mr. Hodgson had previously been associated with Neal & Massev Engineering Co., Ltd., on the same Island.

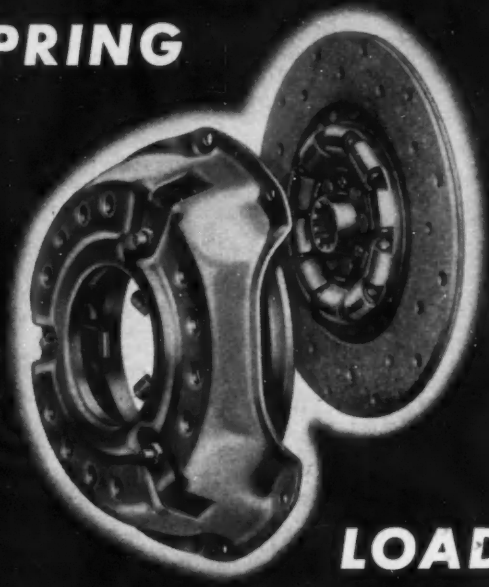
A former lieutenant-colonel, U. S. Army Ordnance Department, Washington, **R. E. JEFFREY, JR.,** is now senior engineer, Product Application & Development Department, Shell Oil Co., Inc., San Francisco, Calif., where he had been employed previously. He saw service overseas and was an important Army-industry liaison officer.

BEWLEY D. PRIESTMAN is now project engineer, Fisher Body-Ternstedt Division, General Motors Corp., Detroit. He had been employed as design draftsman, Firestone Tire & Rubber Co., Akron, Ohio.

WALTER H. WARNEKE is now production manager and vice-president of Sea-Land Frosted Foods Corp., Boston, Mass.

ROCKFORD

SPRING



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LIFETIME ADJUSTMENT *

* ROCKFORD Spring Loaded CLUTCHES are adjusted at the factory, to extreme accuracy, so that no further adjustment will be required during the life of the clutch facing. Any take-up that may become necessary is made at the pedal. This permanent adjustment feature saves servicing, promotes smooth engagement, and prevents grabbing and chattering.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION BORG-WARNER

316 Catherine Street, Rockford, Illinois, U.S.A.

Previously sales representative, S & B Machine Corp., Wayne, Mich., **ELDRED H. HUFF** is now chief inspector, Experimental Engineering Division, Bendix Aviation Corp., Detroit.

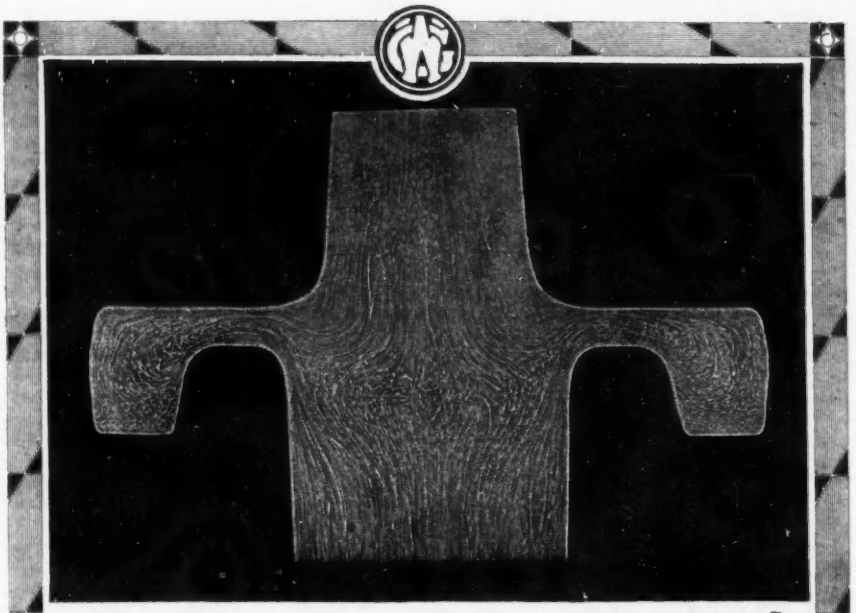
IRVING BRADLEY has taken a position as mechanical engineer, Ballonoff Metal Products Co., Cleveland, Ohio.

ENSIGN HAROLD R. TOWERS is currently stationed with the Instrumentation Division, Flight Test, Naval Air Station, Patuxent River, Md. He had been an enrolled student at Rensselaer Polytechnic Institute.

Formerly an ensign in the U. S. Navy and a senior design engineer, Emerson Electric Mfg. Co., Turret Division, St. Louis, Mo., **ROBERT I. GOLDBERG** is now employed as chief designer, Display House, Philadelphia, Pa.

A. A. McCORMACK, formerly a partner with McCormack & Rieske, Dayton, Ohio, has established himself as a consulting engineer with headquarters in the Cooper Building in that city.

JOHN B. COLE is president of Cole, Inc., an aircraft sales, service, and flight instruction concern, Coral Gables, Florida.



Unique is the grain structure of hot worked metal, bars and forgings. Initial rolling of the cast ingot into a bar at the steel mill . . . subsequent forging of the bar in the forge shop breaks up and refines the crystalline ingot structure . . . gives rise to a compact fibre-like flow line structure developed by the elongation of the grains in the direction in which the metal is worked. Result—directionality of physical properties, particularly ductility . . . greater in the direction of the flow lines than at an angle to them.

Wyman-Gordon takes this into consideration in the original design of a finished part, then by scientific die design and proper forging technique, directs, within certain limits, the grain flow in areas of high stress to give maximum properties in those particular areas.

Wyman-Gordon forgings from five to a thousand pounds . . . engineered to meet your own individual requirements. Your inquiries will receive prompt attention.

WYMAN-GORDON

Forgings of Aluminum, Magnesium, Steel

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HARVEY, ILLINOIS - DETROIT, MICHIGAN

JOHN HARRY DOUMA, a former enrolled student at Michigan State College, is currently associated with Ford Motor Co., Dearborn, Mich.

GERALD J. McCAUL has returned to Allison Division, General Motors Corp., Indianapolis, as a project engineer, after four years' service in the United States Army Air Corps. Capt. McCaul assisted in the development of jet propelled fighter planes at Muroc Flight Test Base, Muroc, Calif., and for this service was awarded the Army Commendation Ribbon.

Previously chief draftsman, Buda Co., Harvey, Ill., **PAUL W. WETZEL** is currently employed at Le Roi Co., Milwaukee, Wis. Mr. Wetzel is temporarily assigned to the experimental laboratory.

A former technologist with the U. S. Army Holabird Signal Depot, Baltimore, Md., **PROSPER L. KINSELLA** is now co-owner of the Automotive Sales & Service Co., Salem, Ill.

JOHN A. JAMES has taken a position as laboratory technician, Socony-Vacuum Oil Co., Paulsboro, N. J.

DR. CHARLES A. NAGLER has terminated his appointment at the University of Minnesota, Minneapolis, and accepted a position as associate professor of physical metallurgy, Department of Chemical Engineering, Wayne University, Detroit.

Upon his discharge from the AAF Air Technical Service Command, **GERALD J. MILLS** has opened a consulting engineering office at Venice, Calif.

ENSIGN ERNEST DEAN MORRIS, USNR, has returned from Shanghai, China, and is now living in Arlington, Va.

Formerly layout engineer for Douglas Aircraft Co., Inc., **CHARLES HENRY RICHART** has joined the Sam Bairstow organization as a manufacturers' representative on building hardware sales.

Upon his release from the Navy as a lieutenant recently, **W. STEWART ROBERTS** has joined Allison Division, General Motors Corp., as a senior project engineer.

W. R. McKELVY has resigned as project engineer of Curtiss Propeller Division, Curtiss-Wright Corp., Caldwell, to join Patchogue-Plymouth Mills Corp., New York City. He is membership chairman of Metropolitan Section, SAE.

JACK JEROME has joined Greer Hydraulics, Inc., Brooklyn, as assistant chief engineer. He had been chief engineer of Airex Mfg. Co., Long Island City, N. Y.

CHARLES F. BRADSHAW has opened a service station at Columbia City, Ind., upon his return from military service with the AAF at Wright Field. He was a carburetor engineering specialist.

Now assistant to the director, Aeronautical Research Laboratory, University of Kentucky, Lexington, **CAPT. RALPH J. ESCHBORN** had been chief of the Engine Unit Equipment Laboratory, AAF, at Wright Field, Dayton, Ohio.

West Coast Potent n Engine Design

Digest of paper

by CHARLES A. WINSLOW

Winslow Engineering Co.

■ No. California, June 11

(Paper entitled "Historical Development of Internal Combustion Engines on the West Coast")

GASOLINE engines built on the West Coast are second to none in the world today, Mr. Winslow asserted in a comprehensive story of men, companies and equipment which make up the history of engine development in that area. He named 44 West Coast companies prominent in building up and perfecting the internal combustion engine and the accessories needed to make it work, citing them as examples of many more which also have contributed.

Historical data gathered by Mr. Winslow show that these organizations comprise a great engineering force, both in size of operations and in wealth of technical contributions to design. In many cases, they have conducted important tests and made available major research facilities for Eastern producers – in addition to carrying on their own operations.

A showing of slides illustrating the great variety of engines developed on the West Coast concluded Mr. Winslow's presentation.

Concise Performance Data Asked On Plane Accessories

Digest of paper

by EDWARD W. ANGER, JR.

Lockheed Aircraft Corp.

■ So. California, March 8

(Paper entitled "Selection of Aircraft Accessory Equipment")

FOLLOWING V-J day, many manufacturers of accessory equipment dropped out of the field without warning, feeling the demand did not warrant continuation. In this transition period, costly delays in production plagued aircraft manufacturers.

Operational systems, according to Mr. Anger, now have become extremely complex; equipment must be intricate and precision-made to accomplish new and complicated functions automatically. More and more difficulty is encountered in evaluating and selecting equipment for the job to be done.

Important Aspects of Selection

In an effort to dispel some of the prevalent confusion, Mr. Anger suggested a few of the important aspects to be considered in selecting equipment, and outlined some general rules for manufacturers of accessory equipment faced with the problem of supplying accurate, informative data to customers. Current proviso of standardization with one supply source increases the engineer's responsibility for thorough investigation of all available commercial and military test reports. In addition, he is faced with the problem of judging the merits of catalog descriptions processed by advertising departments of supply firms.

Recommended Catalog Contents

In this connection, the author recommends, final checking of catalog contents for accuracy and newest technical data should be made by engineers. Catalogs should include:

1. Performance data: pertinent information about system pressure or voltage, pressure drop or current drain, efficiency and performance curves, tension, and so on.

2. Installation data: envelope dimensions, exact size, location and manufacturing tolerance of mounting holes and studs, center of gravity, required free space around the unit to permit servicing.

3. Operational conditions: specific reactions of equipment to various conditions and situations as determined from laboratory and field tests, best position and method of mounting, service instructions, life expectancy.

Calibration of Rochester ammeters against master instrument.

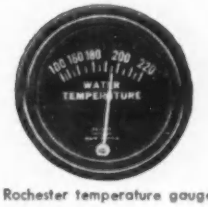
SHOCK PROOF

Pulsation and vibration set up severe shocks on pressure and temperature gauges as well as ammeters. Rochester takes care of this problem by providing each unit with a "pulsation or vibration dampner." This minimizes shock, keeps the instrument accurate and makes reading easier. It is one of the reasons Rochester gauges ride all of the best tractors.

Heavy-duty back plates also help to absorb overload pressures and, of course, the diaphragms and pointer controls withstand shock four to five times higher than the gauge ratings. These design features, coupled with moving parts that are machined to tolerances as close as .0002" assure you that Rochester gauges can take it.

Rochester ammeter

Rochester pressure gauge



Rochester temperature gauge

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Rochester Guaranteed Accuracy

ENGINEERED INSTRUMENTS

LIQUID LEVEL, TEMPERATURE AND PRESSURE GAUGES

4. Specifications: AN Board, Army or Navy specifications which the equipment has met.

5. Weight.

6. Environmental resistance: commercial airlines now require equipment to be independent of environment as did the military services. Included in this category are altitude, temperature, fungus growth, salt water, and vibrations.

7. Noise suppression.

Such a service, he feels, would aid not only buyers but manufacturers themselves, by expediting ordering and thus eliminating many last minute rush orders.

APPLICATIONS Received

The applications for membership received between July 10, 1946, and Aug. 10, 1946, are listed below. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.

Baltimore Section: S. Gordon Ponder.

British Columbia Group: Andrew M. Lovick, John Bernard Tompkins.

Buffalo Section: Richard Adams Bor

Canadian Section: W. A. R. Davi Kenneth Clark MacAlpine Giffen.

Chicago Section: Carl E. Atkin George R. Caskey, Eric W. Lager, Kenneth Henry Pelgrim, Rex A. Prunty, George W Pusack, Robert E. Schmidt, Frank P. Tisch H. Earl Williams.

Cleveland Section: Robert F. Oste Vern Gordon Rollin, John F. DiStefano.

Dayton Section: Ralph R. LaMotte.

Detroit Section: John H. Allmand Prof. Emerson Ward Conlon, George R. Coss, C. Robert Duncan, Howard E. Hesse berg, J. Stanley Hoddy, Pierce Hollingsworth, Jackson Hugh Allington, Lawrence A. Hyland, Theodore A. Lenda, Bernard Meldrum, Lloye E. Muller, Joseph Pickl, Jr., R. J. Wahrenbrock.

Hawaii Section: James Allan, Albert J. Bravo, John Edward Lewis, Ralph Howard Moyers, James H. Stickler.

Kansas City Section: W. P. Justice

Metropolitan Section: Michael Casuba, William Francis Davis, William Fischer, Howard W. Frank, Gene W. Goble, Joseph Gilbert, David Gordon, Joseph P. Hannon, Frank J. Hart, Richard D. Kaplan, John W. Limpert, Robert F. Lyon, John T. Mitchell, Jr., Carl Louis Otto, Clarence T. Pamp, Jr., Thomas M. Ryan, Henry G. Steinmetz, Jr., William J. H. Vossbrinck, M. W. Ziegler, William W. Ziegler.

Mid-Continent Section: M. C. Murrell, Duncan H. Stoddard.

Milwaukee Section: Michael L. Brumm John E. Harley.

Mohawk-Hudson Group: Frederic P. Porter.

New England Section: Gilbert W. Stevenson.

Northern California Section: Joseph Clark Dixon, Ernest H. Gremminger, W. Porter Miller

Northwest Section: R. A. Oliver, F. R. West.

Oregon Section: Alexander Rankeillor Arnot, John Curtis Heilbronn.

Philadelphia Section: Frank G. Burkhead, Kaiser Fleetwings, Inc., Raymond B. Rogers.

Pittsburgh Section: Clarence Edward Cox.

Southern New England Section: Joseph Robert Demers, Louis H. Frese, Wil-

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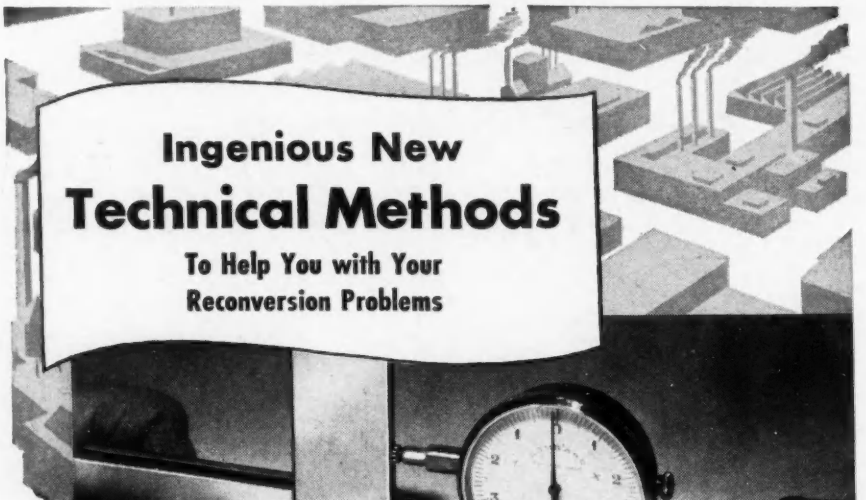
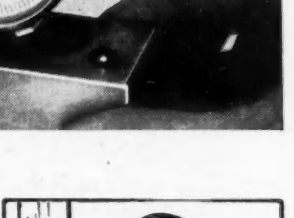


New Micro Square Instantly Checks Right Angles to One 10,000th Inch!

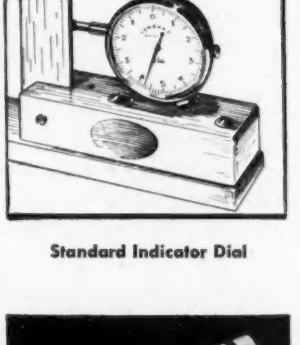
Ideal for precision testing, the Acro Micro-Sine Square quickly and accurately checks right angle work to 1/10,000th inch within a given distance. Its standard indicator dial instantly registers error, location of error, and amount of correction required. Designed for tool and die shops, machine shops and testing laboratories, it also provides a standard for checking master squares, tri-squares and tools.

The Acro Micro-Sine Square is very simple to operate, saves hours of time. Made of hardened tool steel, in ground and lapped precision construction. Available in two types: (1) Standard precision gauge in tenths, (2) Lever indicator in thousandths. Both complete with master checking blocks and carrying cases.

On precision jobs, requiring a static position and mental alertness, workers undergo nervous tension which often results in fatigue. Tests have shown that the act of chewing helps relieve tension—helps workers stay alert, thus increasing their efficiency to do more accurate work. For this reason, many plant owners urge workers to chew Wrigley's Spearmint Gum on this type of job.



Standard Indicator Dial



You can get complete information from Acro Tool and Die Works 4554 Broadway, Chicago 40, Illinois

AA-88

NEW MEMBERS Qualified

These applicants who have qualified for admission to the Society have been welcomed into membership between July 10, 1946, and Aug. 10, 1946.
The various grades of membership are indicated by: (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate Member; (SM) Service Member; (FM) Foreign Member.

Baltimore Section: Harold D. Duppstadt (SM).

British Columbia Group: William John Lloyd (A).

Buffalo Section: Edward W. Burd (M).

Canadian Section: George O. Clermont (A), Sydney G. Fearman (A), Ralph Gruber (A), William H. Maybee (A), Daniel Ivan McTavish (A).

Chicago Section: William H. Clancy (J), W. L. Collins (A), Howard A. Cronmiller (A), Charles H. Flubacker (J), Stephen M. Lillis (M), Howard E. Paulson (M), Philip Earl Rinck (J), Donald W. Tyler (M), Vernon W. Wells (A).

Cincinnati Section: Elmer T. Kramer (A), George Frank Rose (A).

Cleveland Section: Wm. F. Billingsley (M), J. Delmont Durham (J), Dafydd William Evans (J), Robert C. Kohl (J), Arthur H. Schweitzer (M).

Dayton Section: Joe Wallace (M).

Detroit Section: Eldred W. Beckman (J), Arthur B. Billet (J), Howard B. Dickie (J), Edward R. Fitzpatrick (A), Herbert B. Ford (J), George O. Gale (J), Lynden H. Garrison (M), Henry C. Grebe (M), Erwin R. Habermas (M), William E. Harrison (M), James M. Hart (M), Christopher Joseph Hubbard (M), George H. Hunt (M), Charles A. Iles (M), Everell Willis Jewett, Jr. (J), Raymond G. Johnson (A), Lawrence J. Kehoe, Jr. (M), J. Weller Loveday (A), Dewey L. Maker (M), George K. Malone (M), Richard J. Morel (J), George D. Pence (A), Edward M. Sharer (M), Leslie Southgate (J), Frederick R. Steese (J), Donn K. Tippy (A), Michael P. Vengris (M), Max E. Wilde (A), E. P. Wise (J), Robert Edward Zoellner (J).

Hawaii Section: Maurice C. Butler (A), Charles L. Eaton (A), Lewis M. Hubbard (A).

Indiana Section: Edgar George Davis (M).

Kansas City Section: Albert H. Kaiser (A), Clarence E. Meyer (A).

Metropolitan Section: Robert Dawes (J), Benjamin J. DeSimone (M), Harold Irwin Fink (J), A. Frank Geiler (M), Jerry R. Hudnall, Jr. (J), Jay Jonas (J), Robert G. Kaiser (J), Albert Lake (A), Leon A. Mavbarduk (M), Willard Chalmers McMullen (J), Edward A. Neu, Jr. (J), Lester E. O'Brien (A), Harold K. Paiton (A), William Prince (J), Thomas A. Simpson (J), Foster B. Stulen (M), John L. Weiler (J).

Mohawk-Hudson Group: D. Frank Hayes, Jr. (A).

New England Section: George A. Gardner (M), Capt. Herbert W. Kieffer (SM), Carl H. Thurston (A).

Northern California Section: R. C. Barton (M), James Kenneth Hupp (M), J. M. Plantfeber (M), C. R. Stanley (M).

Northwest Section: Charles F. Bartley (A), Richard H. Norton (A), Howard Charles Tinney (J).

Peoria Section: Otto C. Reichel (J).

Philadelphia Section: Gerald von Stroh, II (M).

Pittsburgh Section: A. Wayne Gordon (A), William A. Howe (M), W. Orland Lytle (M), A. W. MacLaren (M).

St. Louis Section: Walter H. Krupp (J).

Salt Lake Group: Dean C. Despain (A), Harold C. Slack (A).

Southern California Section: Francis N. Beauvais (J), Edward Reilly Devine (A), Bruce E. Dixson (J), Chas. J. Eckenroth

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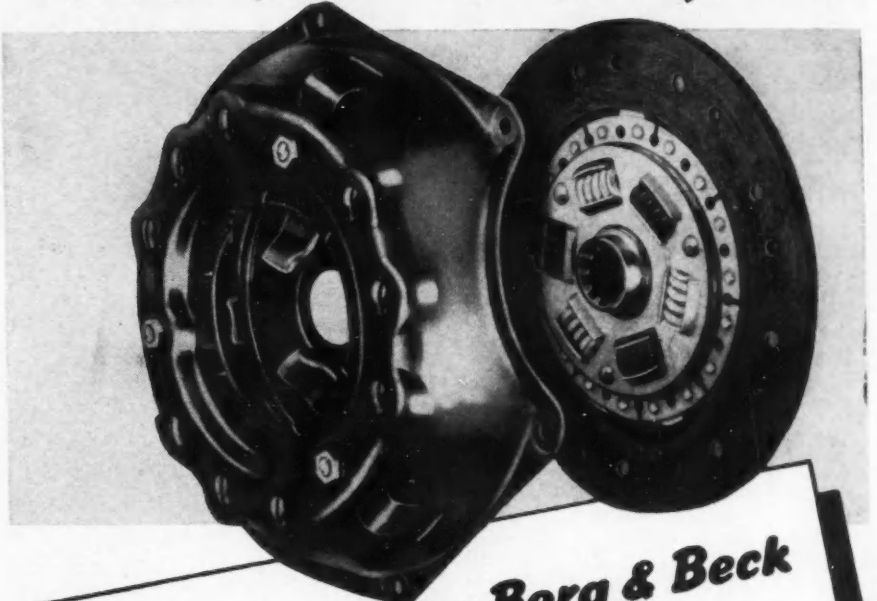
BORG & BECK

For that vital spot where Power takes hold of the load!



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means . . . designed and built by highly-trained men whose skills are completely concentrated on the making of finer Borg & Beck clutches!

BORG & BECK CLUTCH — THE STANDARD

B-W — ENGINEERING — PRODUCTION

BORG & BECK DIVISION
BORG-WARNER CORPORATION
CHICAGO, ILLINOIS

(A), John Byrne Healey (J), Fred C. Heinig (J), A. Allen Johnson (A), Carl L. Kieldsen (A), Richard Warren Lawton (J), Raymond J. Moore (J), Harry D. Percy (J), Raymond Ralston Pritchard (J), Oren V. Roberts (A), (Miss) Mary Sherry (A), (Mrs.) Rebecca H. Smith (M), Joseph F. Steele (J), Calvin T. Thomas (M), Budd D. Tucker (A), Charles W. Yaeger (J), Arthur H. Yerxa, Jr. (A).

Southern New England Section: Raymond C. Amiot (J), Harry D. Martin (M), Horace B. Van Dorn (J).

Texas Section: Cornelius H. Blase (A), Herbert A. Helstrom, Jr. (M), Ernest D. Seale (A).

Twin City Section: Edward M. Baltuff, Jr. (A), Stuart B. Haessly (M).

Virginia Group: Selden Longley Baird (M).

Washington Section: Edward L. Hollady (A), James Jensenius Myers (J).

Western Michigan Section: Samuel A. DeMilio (A).

Wichita Section: Royce Edgar Means (A), Ewald William Nath (A).

Outside of Section Territory: Reginald Rufus Beezley (A), Given W. Spragins (A).

Foreign: Col. Richard Thomas Barr (FM), England; Alexander Callender (FM), England; Joseph Foster Cardwell (A), England; Roy Erwin Foster (A), Australia; John Jameson Edgar Gill (FM), South Africa; Miguel Erique Guermont (FM), England; Alfred Giles Lovie (A), New Zealand; Rio Nusser Van Mirza (FM), England; Dahlke Migara Ratnatunga (FM), England; Cyril James Tafft (FM), England.

"Tappets are Our Business"
Precision Production . . .
Craftsmanship developed and practiced over a period of many years is needed to make valve tappets — for internal combustion engines — faultless in material and form. Produced to tolerances of ten thousandths of an inch, JOHNSON Tappets are known throughout the industry for their qualities of precision, performance, and dependability.
Let JOHNSON — who specialize in tappets alone — serve you. Write today.
Johnson Products Inc.
Muskegon, Michigan

Applications Received

cont. from p. 46

liam C. Marsh, Robert F. Nostrant, Francis W. Powers.

St. Louis Section: Jack E. Fleischli.

Salt Lake City Group: Paul E. Thompson.

Spokane Group: Ernest J. Eldenburg, Dwight F. Hume.

Southern California Section: Harold I. Covey, Raymond A. Gleetzner, Thomas W. Gluck, William T. Mickle, Harold Wayne Miller, Murray J. O'Toole, Randall Davis, Don D. Remer, Frederic J. Robbins, Edward D. Rohn, Arthur M. Rudd, Loyd A. Somers.

Wichita Section: George C. Jehle.

Washington Section: Harold L. Belanger, I. Paul Wang.

Williamsport Group: Ralph T. McRae.

Outside of Section Territory: John A. Banyard, El-Jane Beverly, Earl A. Bohner, Jr., Lt. Paul E. Chamberlin, Duff Green, Jr., J. M. Johnston, Doane Morris.

Foreign: Charles Douglas Carmichael, England; Nuh Ergeneman, Turkey; Etienne Escola, France; Roderic Parry Gordon-Jones, England; Rene Lucien, France; Ralph L. Noyes, India; Nils E. Nystrom, Sweden; Robert Oldfield Wilson, England; Edward Victor Paterson, England; George Maxwell Tompkins, South Africa.

Student News

cont. from p. 30

such as the five-gallon combat container. Lt.-Col. Grunder also spoke on German fuel production and presented numerous illustrations showing the importance of specialized knowledge of oil in military operations. His conclusion was that the field of information has enlarged so rapidly in recent years that engineers now know less of the total knowledge than ever before.

On July 27, the Caltech Branch visited the Long Beach steam station of the Southern California Edison Co. The plant is modern, and is used as a peak-load station. It is equipped to burn natural gas or fuel-oil, but no provision is made for firing coal. Cooling water for the condensers is pumped from the Pacific Ocean a few thousand yards from the plant.

The SAE and ASME student chapters at Caltech held a joint meeting with Dr. Joseph Manildi as featured speaker on August 9. His topic was "Jet Propulsion." He attempted to clear up misconceptions about jet propulsion due to newspaper reports, and compared the different types of jet engines in regard to operation and performance.

WHA

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